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Henry Malcolm Esq.

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Presented by
Mr. Malcolm
to

Ed. Duffie

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A
DESCRIPTION
OF THE
JAIL DISTEMPER
AS IT APPEARED AMONGST THE
SPANISH PRISONERS, AT WINCHESTER,
IN THE YEAR 1780.
TO WHICH IS ADDED,
AN APPENDIX,
CONTAINING
AN ACCOUNT OF THE EXPERIMENT
MADE AT THE DESIRE OF
THE LORDS COMMISSIONERS OF THE ADMIRALTY,
ON BOARD THE
UNION HOSPITAL SHIP, IN 1795, &c.
TO DETERMINE THE EFFECT OF THE
NITROUS ACID IN DESTROYING CONTAGION,
AND THE
SAFETY WITH WHICH IT MAY BE EMPLOYED.
BY
JAMES CARMICHAEL SMYTH, M.D. F.R.S.
FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, AND
PHYSICIAN EXTRAORDINARY TO HIS MAJESTY.
*Published with the Approbation of the Lords Commissioners of the
Admiralty.*
THE SECOND EDITION.

L O N D O N :

PRINTED FOR J. JOHNSON, IN ST. PAUL'S CHURCH-YARD,
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1803.

1870

1871

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DEDICATION.

TO THE RIGHT HONOURABLE
HENRY DUNDAS,
Esq. Esq. Esq.

DEAR SIR,

WHATEVER reception the following pages may meet with from the public, they must allow the propriety of inscribing them to you; and that a work, which professes for its object the preservation of

the gallant defenders of our king and country, should be dedicated to the person who, upon all occasions, has stood forward as their friend and patron, and who at present possesses so great a share in the direction of the national force. I am ready however to acknowledge, that this dedication is not so much addressed to the minister, as to the man.

I am unacquainted with the language of panegyric, and have not the presumption to imagine, that any opinion of mine, respecting your talents and public character, can have any influence on the public mind. Neither is it my intention to say any thing of your qualities in private life; lest the voice of truth should fall under the suspicion of what I am as far from offering, as you from receiving. My only wish then
is,

DEDICATION.

is, that you would have the goodness to accept this tribute of gratitude, for the many instances of your partiality and kindness, and to believe that I always remain, with the most sincere sentiments of esteem and regard,

DEAR SIR,

Your much obliged, and

very faithful humble servant,

JAMES CARMICHAEL SMYTH.

**London,
14th August, 1795.**

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Henry Malcolm Esq.

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Presented by
Mr. Malcolm
to

Edw. Duffie

Handwritten text, likely a signature or name, appearing in three lines. The text is heavily stylized and difficult to decipher, but appears to be written in a cursive or calligraphic script.



care every thing respecting prisoners of war is immediately committed, had been extremely attentive to their duty, and had employed every means in their power to check the progress of the contagion, though hitherto without effect. Towards the end of May, they, by the advice of the late Dr. Fothergill, applied to me, requesting in the most urgent manner that I would accompany one of the commissioners to Winchester, to undertake the cure of a disease whose violence and fatal effects were encreasing every day; and those gentlemen* will, I have no doubt, do me the justice to say, that however hazardous the undertaking appeared, I readily complied with their wishes, and as they left entirely to me the conditions of my attendance, I made none: convinced that

* Mr. Bell and Mr. Lulman, who were commissioners at the time, can witness this fact, as well as many others.

P R E F A C E.

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no pecuniary recompence could be an adequate compensation to me, circumstanced as I then was, for the risk I ran; and that if I was fortunate enough to survive and succeed, I was certain of the first of all rewards, the consciousness of having discharged a duty to which I was called by the voice of my country, and in the event of which the national character, as well as the cause of humanity, were so deeply concerned.

My success in this undertaking, I may truly say, was equal to my wishes, for in a fortnight's time I had the satisfaction to see the contagion almost compleatly destroyed, the number of sick greatly reduced, and those who remained in the hospital, for most part, in a state of convalescence*.

Upon my return to town I considered that a part, and an important one, of my

* Vid. the Hospital Returns, Appendix.

duty still remained unperformed, and that it was incumbent on me to give some account of the disease I had seen, and to point out those means that had been so successfully employed both in the treatment of the fever and likewise in destroying the contagion. But a series of bad health, the consequence of two very severe attacks of the disorder, prevented me for a time from executing my purpose, and the peace which followed in 1783 superceding, in great measure, the urgency of an immediate publication, I laid all thoughts of it aside, until I could introduce it as a part of a larger * work in which I had for several years employed my leisure hours.

Last summer, however, I was again led to revise my notes in consequence of an application from Dr. Morris, no less flat-

* An Enquiry into the Nature, Origin, and Distinctions of Epidemical Distempers.

P R E F A C E.

tering to me than honorable to him. This gentleman (the son of Dr. Morris, physician to the army in America, and himself a physician to the army) having witnessed the destructive ravages of a contagious fever that broke out on board the Hessian transports at the Isle of Wight, and which afterwards spread amongst the troops stationed in that quarter, was desirous to be informed of the methods I pursued, in the treatment of the Winchester fever, and in destroying the pestilential contagion which occasioned it. In compliance then with his wishes I began to make some abstracts from my notes on this subject, but I soon perceived that the account would be much more compleat and satisfactory, and that it would be attended with very little more trouble to myself, if I executed my original plan. And although the doing it in this hurried manner, upon the spur, I may say, of the occasion, might cause some lit-

the inaccuracies in the style or execution,
yet as my chief object was general utility,
if I succeeded in that, I flattered myself
the public would readily excuse any trivial
faults or omissions.

Of the Jail Distemper, &c.

IN every situation, where a number of people are crowded together, whether in ships, hospitals, or prisons, unless the strictest attention be paid to cleanliness, and to a free ventilation or circulation of air, a fever sooner or later breaks out amongst them, of a very contagious nature, and attended with very fatal effects; and which claims, in a particular manner, the public attention, not only on account of the mortality it occasions, but because this mortality so frequently occurs in our fleets and armies, amongst men who are gallantly exposing their lives in the service of their king and country, and at the very moment perhaps when their services and exertions

are more immediately required. This fever, at present known by the name of the Hospital Fever or Jail Distemper, has been already described by several physicians of eminence; but as the disease, though probably in every instance originating from the same cause, assumes, according to the violence or modification of the contagion, or from other circumstances not yet well understood, a variety of appearances, and has been treated in a very different manner by different physicians, we must acknowledge, that, until all those varieties are accurately pointed out, and the characteristic marks of the distemper distinguished from the necessary or accidental symptoms, its history is still incomplete.

With a view then of adding something to the general fund of medical knowledge, and of rendering more perfect the history of so important a disease, I have presumed to give a brief account of its appearance at Winchester; and this I am enabled to do

not only from what I saw, but from what I felt, having suffered two severe attacks of the fever myself, an experience which no one would willingly repeat.

Sydenham (justly considered as one of the first authorities in physic) has remarked of epidemical distempers, that they are in general more violent upon their first appearance and become milder from their continuance. This observation may be strictly true in certain epidemics, but was by no means so in the present instance, where not only the number of the sick, but the number also of those who perished by the distemper, encreased every day from its first appearance until my arrival at Winchester. But although the frequency of the disease and the mortality caused by it were not abated, I had reason to think, from the report of the surgeon, that the symptoms were somewhat different in the beginning, from what they were when first I had occasion to observe them: petechiæ and other
dis-

discolourations of the skin were then more common, and the head was likewise more frequently affected.

Description of the Fever.

THE disease in general attacked suddenly, and the stomach was always the part first affected; a very disagreeable feeling and sinking at the præcordia, or at what is called the pit of the stomach; a degree of nausea and giddiness were the first symptoms, which were soon accompanied with a pain immediately above the eyes and at the temples, or a dull pain at the back part of the head. The sick complained also in the beginning of coldness and chilliness, seldom of thirst, always of great weakness and debility, had a tremor upon them, sighed frequently, and when asked any questions about their complaints, universally put their hand to the region of the stomach,

stomach, expressing in the strongest manner, that there was the chief seat of their uneasiness and sufferings; their countenance was commonly pale and dejected, and their eyes looked dull and heavy, though the tunica albuginea of the eye was of a clear white; their tongue was moist, and covered with a cream coloured slough or mucus: they were in general costive, with the abdomen tense and hard; the pulse was for the most part small and fluttering, in some few instances it was but little altered from a natural state, although the danger was not less on that account. The sick seemed always drowsy, and commonly remained in a state of dozing or slumbering during the whole course of the disease; but when spoke to they awoke readily, and when quite awake gave distinct answers to any questions put to them. Few were permanently delirious or comatose, unless for some short time before their death, and many, as I was informed

formed by the Spanish clergyman who attended them, were sensible to the very last.

Mr. Kentish, surgeon to the hospital, informed me, that upon the first appearance of the distemper, or soon after the arrival of the Spaniards, he had, in some few instances, observed swelling of the parotid glands and petechial or purple spots on the skin; but certainly, during the whole of my stay at Winchester, neither discolourations of the skin, miliary eruptions, hemorrhages, parotids, nor bubos, could be justly enumerated among the symptoms of the disease. Many of the sick complained of a sore throat, or of pain and uneasiness in swallowing; some were seized with a difficulty in breathing and other pneumonic symptoms; one man had an abscess in the liver; but in the greater number of those who died, excepting the uneasy sensation at the region of the stomach, there was no appearance of local inflammation or of local disease: so deceitful

ceitful indeed was this distemper, that several, who (judging by their pulse or even countenance) had but a slight appearance of indisposition, died in twenty-four or indeed in twelve hours after their reception into the hospital. The blood taken away in this fever was (as I was * told) of a loose texture and cohesion, though the smell of the sick or of their evacuations had nothing in them remarkably offensive or putrid. From observing this circumstance, and that petechiæ, vibices, or hemorrhages, rarely occurred, that the sick, in general, retained their senses, were able to raise themselves in bed, and to assist themselves with what they wanted; I could not at first allow myself to think that the disease was of so malignant a nature, or that the danger was so great as had been represented to me; but I was soon convinced of my error by seeing the numbers that perished daily with all those flattering appearances.

* None of the sick were bled by my desire.

It has been frequently remarked, that, in malignant fevers, the danger cannot be estimated by the state of the pulse, or from the ordinary symptoms of the disease; but there never was a more striking illustration of the truth of this fact than the present instance afforded; all that could be known was, that a person seized with this fever run the greatest risk of his life be the symptoms ever so favourable: even those who escaped from the more immediate danger of the disease, recovered in general very slowly, were a long time weak and subject to returns of fever, or they fell into chronic disorders which in the end proved no less fatal. Those who suffered a relapse commonly died; there was scarcely, I believe, an instance of a person being a second time dismissed from the hospital.

To the preceding general description of the disease, taken from the appearances and relations of the sick, I shall subjoin an account

count of it in my own particular case, in hopes of throwing a still greater light on the nature of this distemper, as every person knows that we describe better what we feel, than what we only see; and that we attend with much more accuracy to our own sufferings than to those of others.

Description of my own Case.

ON the fourth day after my arrival at Winchester, I was engaged, for a considerable part of the morning, in the agent's office, (a room within the prison) attending an examination of the nurses of the hospital, respecting a complaint made by the sick against the surgeon; as likewise an examination of some of the prisoners who, having attempted to escape, had been confined for some days in the cashot or black hole. Whilst in the house I felt no inconvenience, but upon coming out into the
open

open air I found myself extremely giddy, with a considerable degree of nausea or sickness, which however soon went off. Before dinner I took some tincture of bark in a glass of water, and dined in my usual way, only that I drank rather more wine than I commonly do; after dinner I had no return of sickness nor of giddiness, but twice or thrice in the evening I had a very uncommon feeling at the pit of my stomach, and which it is impossible to describe; it was a kind of sudden sinking or faintness, and which seemed, for an instant or two, to stop the motion of the heart, but it went soon off, and I imputed it to the quantity* of wine I had drank at dinner. At night I ate no supper, drank a glass of very weak punch, and went to bed seemingly in perfect health, and without the smallest suspicion of my having caught the distemper. About the middle of the night I awoke from sleep with the symptoms of

* The quantity did not exceed a pint.

the most violent fever: I was not sensible of any preceding chilliness or coldness, but the sense of heat, and the oppression at the præcordia, exceeded all description.

The uneasiness and oppression caused a constant involuntary sighing, whilst the sensation of heat gave me the idea of liquid fire spreading from my stomach across my breast, along the course of the pectoral muscles, and down the insides of my arms to the extremities of my fingers. The heat however was not uniformly the same, but seemed to come in flashes, as if fresh inflammable matter had occasionally been thrown on the fire. Notwithstanding those dreadful sensations, I perceived that my pulse was regular, and that the frequency of it was by no means in proportion to the degree of heat and oppression. In the morning, about seven o'clock, I took an opening medicine, consisting chiefly of rhubarb and *kali vitriolatum*; after the operation

of which I drank some tea and attempted to dress myself; but, when out of bed, I found myself so extremely weak that I could hardly stand, and so giddy that I was unable to walk across the room without risk of falling, and my hands trembled in such a manner that I could not write. My tongue was moist, but compleatly covered with a cream coloured mucus; I also felt cold and chilly, and was obliged to have a fire made in my room. During the day I could eat nothing; even the smell of any kind of broth or animal food occasioned sickness, and was particularly disgusting to me. In the afternoon I took, at intervals, nine grains of emetic tartar dissolved in water, which operated four or five times with considerable violence; in the evening I bathed my feet in warm water, and at going to bed took a bolus, composed of James's powder, calomel, and theriaca, drinking afterwards a small basin of white wine whey.

This

This medicine occasioned no sickness ; I passed a very good night, and in the morning, finding myself free from fever, was in hopes that I had succeeded in expelling the contagion entirely ; but my hopes were too sanguine, and I was soon convinced that I had to deal with an enemy that was not so easily overcome. When out of bed I felt myself much weaker than I expected ; I had not indeed either giddiness or oppression at the præcordia, but my tongue was still extremely white, and a very unpleasant sensation remained across my breast, with a sense of numbness in the inside of my arms, extending along the course of the nerves : I had no headach, and my appetite was much as usual. After breakfast I rode out in a chaise for an hour or two ; and, in the course of the day, took twice or thrice some tincture of bark in water. Towards evening I was again chilly. At going to bed I repeated the antimonial bolus, as on the preceding night, but with-

out the calomel, the other having given me two or three motions. I did not pass this night so pleasantly as the former; for though I had no oppression at my stomach, nor burning heat, I could not sleep, was extremely restless, and my pulse was quicker than natural. The day following I again rode out in the morning, and took the bark in substance three or four times. My appetite was still pretty good, but the whiteness of my tongue and numbness of my arms remained as before, with a degree of chilliness always recurring in the evening, and my sleep was interrupted and unrefreshing. In this state I continued during the whole of the week; that is, from the Monday night, when I was first seized, to the Sunday following; when Commissioner Lulman, of whose friendship on this occasion I shall always retain the most grateful remembrance, and whose humanity can only be equalled by the attention with which he discharges every part of his duty, thinking that

that a change of air might be of advantage to me, proposed that, when the business of the day was over, we should ride to Southampton, and pass the Sunday there. I readily embraced the proposal, and accordingly we went to Southampton to dinner. I seemed to derive very great benefit from the change of air, and particularly from the sea-air, which at all times is grateful to me. We walked after dinner on the beach, and in the evening, excepting the numbness in my arms, which I still perceived, I felt myself in my usual health; went to bed early, and without supping, in full confidence of passing a good night; but in this I was greatly disappointed, for I was no sooner in bed than I became restless and uneasy, and, after tossing about for some time, a violent fever came on without any previous coldness or chilliness. My pulse was much quicker than ever I remember to have felt it, or indeed that of any adult who was not in the agonies of death. The heart seemed

rather to vibrate than to beat ; the heat of the body was also very great, especially that sensation formerly described, of liquid fire spreading across my breast and down my arms ; but I had not the same oppression at the præcordia as when I was first seized with the distemper. I had neither headach, pain in my back, nor thirst ; and, excepting the burning heat in my breast and arms, I suffered no particular uneasiness but what arose from the agitation of the heart, and the uncommonly rapid circulation of the blood. This paroxysm, after having continued for about an hour, (having no light in my room I could only guess the time) terminated in a profuse sweat ; during which, the heat of the body and quickness of the pulse subsiding, I fell asleep ; and, in the morning when I awoke, found myself so very well, that I could hardly believe the reality of what had happened during the night. I now flattered myself that, as this was the first time I had perspired

spired during my illness, it was a kind of crisis, by which the disorder would be completely removed; but in this belief I was soon undeceived, for the numbness continuing in my arms, and a degree of chilliness recurring every night, with disturbed and unrefreshing sleep, convinced me that there were still some remains of fever hanging about me. My indisposition however was not so great as to prevent my going on, in the prosecution of the business in which I was engaged; neither was I sensible of receiving any fresh contagion, nor of suffering any aggravation of symptoms, until the day before I left Winchester; when, remaining longer than usual in the hospital, having gone through every ward, and examined, I believe, every patient in it, I perceived on coming out some of the same symptoms as when I was first attacked with the distemper. Determined however to try what change of air would do in removing them, I mounted my horse,

and rode with Mr. Lulman some miles into the country. We dined at a neighbouring village ; and, after dinner, I felt so well that I began to suspect my feelings in the morning had been occasioned more by the recollection of my past sufferings, than from any fresh contagion ; but the following night fully proved the reality of my first apprehensions, as during that I experienced an attack of fever, exactly similar to what happened when I was first seized with the distemper ; the same anxiety, sighing, and oppression at the region of the stomach ; the same feeling of fire extending across my breast and down my arms ; my pulse also was extremely quick, though nothing like what it had been the night I slept at Southampton. In the morning, finding myself greatly indisposed, with a return of vertigo, tremor, debility, white tongue, loathing of food, &c. I again had recourse to the emetic tartar in solution, of which I took eight grains, at intervals, until it vomited me pretty severely.

It

It was my intention to have remained some days longer at Winchester, at least until I had received letters from town; but Mr. Lulman, whose friendship had a right to determine me, urged so strongly the necessity of my returning home whilst I was in a situation to travel, that I yielded to his intreaty, and at eleven o'clock set off in a post-chaise for London, and reached town that evening. I bore the journey better than I expected, considering my extreme weakness, and that, loathing every kind of food, I could take no nourishment on the road.

Soon after my arrival at my own house I went to bed, taking the antimonial bolus as before; the fever returned again in the night, but by no means so violent as on the preceding one: towards morning a perspiration broke out, and as I found, from this circumstance, that the heat of the body was lessened, and the pulse diminished in frequency, I kept it up until I obtained a
complete

complete intermission of the fever, and then began the liberal use of the bark.

I remained, however, for several months, very weak and languid, although I had recourse to sea bathing, and took emetics from time to time, which I found absolutely necessary for me ; but nothing I either took or did removed the disagreeable feeling in my breast and arms, until, the winter following, I applied a blister to the sternum ; this occasioned an eruption of very painful carbuncles all over my breast, and an eruption somewhat similar to this afterwards came out on the back part of my head ; but, notwithstanding those efforts of the constitution to expel this poison, I can with truth say, that I have ever since been subject to complaints and symptoms, to which I was formerly a stranger ; nor will any person be surprised at it, who is acquainted with the virulence and malignity of such a distemper as I have just now described.

Perhaps

Perhaps, in the foregoing description I may be thought to have been too minute or prolix, but my apology is that, for what I know, I am the first physician who has suffered an attack of the jail fever, and lived to give an account of it. My sufferings however, from this cause, were greatly alleviated by the idea of the relief I had afforded to others; and they would indeed be matter of triumph to me, could I flatter myself that the description of them would prove a future benefit to mankind.

At all events I have the satisfaction of having endeavoured, to the utmost of my power, to accomplish this object; and therefore may truly affirm — *Si secuta fuerit quæ debet fortuna, gaudebimus omnes; si minus, ego tamen gaudebo.*

Of

Of the most remarkable Symptoms of the Winchester Fever, or of such as were peculiar to this Complaint.

HAVING finished the description of the disease, it is proper, in the next place, to point out those symptoms which seemed peculiar to this fever, or which distinguish it from other similar distempers.

“A very disagreeable feeling, and sinking, at the præcordia, or pit of the stomach.”

It is well known, that the stomach is generally more or less affected, in all contagious fevers accompanied with eruptions; such as, the small-pox, measles, and scarlet fever; although, in the second, the bowels are perhaps oftener affected than the stomach, and, in the third, sometimes the stomach, sometimes the bowels, and frequently both. Pain and oppression at the region of the stomach is also not
an

an uncommon symptom in the hospital or jail fever ; but I do not remember to have seen this symptom so constantly present and permanent, through the whole course of the disease, as in the present instance.

“ Few were permanently delirious or comatous, unless for some short time before their death, &c.”

In most contagious and malignant fevers, the head is the part principally affected; and the sick are commonly delirious, if not from the beginning, at least in the course of the disease. Convulsions likewise, in consequence of this, frequently occur ; and the fever usually terminates in this way. From dissections also it appears that the brain suffers in a particular manner, and that the immediate injury done to this organ has probably caused the death of the patient. But, in the Winchester fever, though the nervous system was immediately and very considerably affected, as was
4
evident

evident from the vertigo, tremors, sudden debility, irregularity of the pulse, and particular species of headach ; yet the usual or more obvious functions of the brain suffered less derangement, than in many other less malignant fevers ; and the derangement that took place seemed to arise more from the state of the stomach, than from any primary affection of the head.

“ The sick seemed always drowsy, and
 “ commonly remained in a state of dozing
 “ or slumbering, &c.”

This symptom accompanies all diseases where there is a strong tendency in the system to putridity, and therefore not unfrequently occurs in the more advanced stages of putrid fevers ; but I have never met with it so early in the disease, nor so uniformly present from the beginning, as in the Winchester fever. I have often had occasion to remark the same symptom in the second stage of the putrid sore throat, and have, in some cases, seen it prove of
 fatal

fatal consequence ; from the nurses, or those employed about the sick, mistaking this dozing for natural sleep, which they thought it would be improper to interrupt by giving food or medicine.

“ Their eyes looked dull and heavy,
 “ though the tunica albuginea of the eye,
 “ was of a clear white, &c.”

This appearance of the eye I never saw in any malignant or contagious fever except the present ; and, previous to my going to Winchester, I had concluded, as the result of my experience, that a turbid appearance, or redness, of the tunica albuginea of the eye, was a constant and distinguishing symptom of a fever of the contagious kind. It is so in the small-pox, measles, scarlet fever, &c. and I had observed the same kind of appearance in all those jail or hospital fevers which I had formerly seen. I had not however been long at Winchester, before I was convinced of the danger of establishing general observations ; and, as I could

not resist the evidence of my sight, was obliged to confess that, in the generality of the sick, the white of the eye had more of the pearly whiteness observable in consumptive persons, than the redness, or turbidness, usual in contagious fevers.

“ Their tongue was moist, and covered
“ with a cream-coloured slough or mucus,
“ &c.”

This appearance of the tongue cannot be said to be peculiar to this fever, but it remained longer than is usual in similar cases; in general, the tongue soon becomes red, or black, and is almost constantly parched, when the fever has continued any considerable time.

“ In the greater number of those who
“ died, excepting the uneasy sensation at
“ the region of the stomach, there was no
“ appearance of local inflammation, or of
“ local disease.”

In most malignant fevers, where the disease proves fatal, it has been remarked that
the

the brain, lungs, intestines, or in short some viscus immediately necessary to life has been affected by inflammation, which suddenly terminating in gangrene, causes the death of the patient: but this termination was by no means frequent in the disease in question; for, although it be true, as I have already stated, that there were some examples of inflammation affecting the fauces, the lungs, the liver, and also the intestines, yet in the far greater number of those whom the fever destroyed, there was no reason to apprehend that any such circumstance had happened, or had caused the fatal catastrophe.

The present contagion, in its effects, had much more resemblance to a sedative poison, acting immediately on the stomach, and indirectly on the heart, whose motion it weakened and finally destroyed.

The jail distemper at Winchester afforded likewise a striking example of a highly contagious and fatal fever, accompanied by

D

few

few of those symptoms that have been looked upon as characteristic, or inseparable from diseases of the putrid or malignant kind : neither petechial, nor any other discolouration of the skin, hemorrhages, rash, parotids, or bubos, were common symptoms in this fever ; and yet the disease proved almost as fatal, and often as suddenly so, as the real plague or pestilence ; which plainly shews how little those symptoms are to be considered as the distinguishing marks of malignity in fevers, the only criterion perhaps of which is the sudden debility, dejection, anxiety, giddiness, and tremors, when unpreceded by any considerable evacuation, either natural or artificial.

Causes

*Causes which contributed to the Mortality of
the Spanish Prisoners at Winchester.*

To those who are acquainted with the great attention paid by this country to the treatment of prisoners of war; who know the healthy situation of Winchester, the largeness and airiness of the prison wards, with the convenience and advantage of the airing ground; &c. &c. it will possibly be matter of surprise, that even a jail distemper should continue to rage for so long a time, and with such fatal violence, as was the case in the present instance. The subject certainly requires some explanation, and it may not be improper to give it in this place.

The seamen of Don Langara's fleet had been long confined on board their ships before they sailed from the ports of Spain; from which circumstance, added to their

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want

want of cleanliness, the virulence of the contagion had arisen to a very high degree before they came to Winchester.

2dly. They brought with them all their clothes and bedding, which were well calculated to retain the contagion, and proved the great source or fomes of it.

3dly. They were so much afraid of the cold, and particularly of the dampness of our climate, that they kept the hospital and prison wards as closely shut up as they could; for the same reason, they remained much in bed, or, when out of bed, were constantly wrapped up in their cloaks or mantles. Nor was it possible when I first went there, without using violence, to prevail on them to go out into the airing-ground; and it was still more difficult to get them to take out their bedding, for the purpose of exposing it to the open air.

4thly. Many of the prisoners belonged to the Caracca company, and had private adventures on board: these men, when captured,

captured, having lost their all, were particularly low spirited, and consequently were more liable to suffer from the distemper. It was remarked, that they were the first who were seized with it, and most of them died.

sibly. The Spaniards, owing to some dispute they had with the surgeon, entertained prejudices against him, and were therefore unwilling to complain, or to apply for admission into the hospital, till it was too late to derive benefit from any medical treatment; they even concealed their indisposition as long as it was in their power. In passing through the courts of the prison, I have observed at different times, some of those poor people, unable to stand, their countenances pale and dejected, lying along by the walls of the building which were most exposed to the sun; and, notwithstanding this exposure, and their being wrapped up in their cloaks or mantles, they were shivering with cold like a person in a fit of the ague. I shall never forget how much I

was shocked the first day I entered the hospital, at being obliged to step over a poor man, who was lying across the threshold of the door, either dying or dead.

6thly. It must also be acknowledged, as another cause of the mortality, that owing to the number of sick increasing so rapidly and unexpectedly, they could not be properly accommodated in the hospital, which was by much too crowded.

The above circumstances, without including many others of less importance, and which it is unnecessary here to detail, will serve, in a great measure, to explain the mortality that happened. I shall therefore now proceed to a more interesting and important question, *viz.* to determine if possible the particular nature of the jail contagion.

*Of the Nature of the Contagion, which gives
rise to Jail and Hospital Fevers.*

THAT we may be able to form a more accurate judgment of the nature of the contagion, which gives rise to this species of fever, we shall consider it under four different points of view.

In the first place, how it is generated; 2dly, in what manner it is propagated, with the circumstances more or less favourable to its communication; 3dly, its effects on the human body; and, 4thly, the means of weakening its virulence, or of entirely destroying it.

Whoever has considered contagious fevers with attention must have observed, that they are of two very distinct classes. The first may properly enough be called *specific contagions*, as they do not arise from any general quality, or process of nature, with —

which we are acquainted; and, as they have a peculiar origin, they excite diseases of a peculiar kind; differing in many respects from every other, but in nothing more remarkably, than in this, that the peculiar disease can only take place once in any individual; and there are some persons, in whom this contagion never can produce any morbid symptom. How many peculiar or specific poisons there are in nature is not yet ascertained; but the small-pox and measles are evidently such to man, and we know likewise that there are others peculiar to certain animals.

The second class of contagious fevers, may be named *general contagions*, as they arise from a general cause; or they may be named *putrid*, as they will be found, in every instance, to be the result of putrefaction; a process, probably, the most general in nature with which we are acquainted, and to which all vegetable and animal substances, under certain circumstances,

stances, are liable. That the contagion, or miasma, of the jail and hospital fever is of this kind, admits of every species of evidence a matter of fact and of observation can do.

We remarked, in the beginning, that this disease is constantly produced where a number of people are shut up together in a close place, without the greatest attention to cleanliness, and a renewal of the air. We know, that all the excretions of the human body have made a certain advance or progress towards putridity, and that, placed in circumstances favourable to putrefaction, they soon become highly putrid. We are certain, that of all the human excretions, none is more highly animalised, or so susceptible of becoming putrid, as the perspiration or vapour issuing from the surface of the body and lungs. We know also that the perspiration even of vegetables, confined under similar circumstances, becomes putrid, and in a high degree noxious to man : a *fortiori* then,

then, we may conclude, that animal perspiration undergoes a similar alteration, and will prove still more noxious.

We find also, that the contagion, resulting from animal perspiration, shews its baneful effects more quickly, and more forcibly, in proportion to its quantity, and to its being placed in circumstances the most favourable to putrefaction; consequently, in proportion to the size and closeness of the place, the temperature and moisture of the air, and the additional or accessory putrid matters with which it is combined.

We find likewise, that the formation of this contagion is prevented by causes that renew the air, and carry off the perspiration, or prevent its tendency to putrefaction.

We observe also, what may be considered as an analogical proof, that a contagious vapour, differing only in degree of virulence from the human miasmata, is constantly produced from water alone, and still more from water mixed with vegetable

ble and animal matters, when exposed in sufficient quantity and under circumstances favourable to putridity ; but the septic nature of the jail contagion will be farther illustrated, by what we have to notice of its effects on the human body, and of the methods of destroying it, or of rendering it harmless.

Of the Manner in which Contagion is communicated.

EVERY person knows that contagious fevers, whether *specific* or *putrid*, are propagated by an immediate communication with the sick, either by contact or contiguity. How far the contagious atmosphere extends, is impossible to ascertain, as this must admit of great latitude, according to the virulence of the disease, situation of the sick, season of the year; state of the atmosphere, &c. My ingenious and respectable friend

friend Dr. Haygarth is of opinion, and indeed has shewn, that in the small-pox it is much more limited than was apprehended. But it is not only from a direct communication with the sick that contagious fevers are propagated; unfortunately, the persons and clothes of those who remain long in a contagious atmosphere, and the excretions of the sick, are capable (even when conveyed to a great distance, or preserved for a length of time) of producing the same mischief as an immediate communication with the sick themselves. Of this fact the examples are so numerous as to put the matter beyond the possibility of a doubt. Here again, the opinion of my friend Dr. Haygarth differs from the opinions formerly entertained by physicians. For, though he admits, that the variolous matter, and the more sensible excretions of the sick, are capable of communicating the disease, and, if close shut up, of retaining that power for a long time, he does not think, that the contagious

gious vapour, immediately arising from the sick, can be retained by the clothes of those confined in the variolous atmosphere, or by the furniture in the chambers of the sick, so, as to communicate the disease to such as have not themselves been immediately exposed to it. No one can have a greater respect for the opinions and observations of Dr. Haygarth than I have, as no person is better acquainted with his candour and accuracy. I readily agree with him, that the dread of those terrible diseases, and the natural fears of men, have possibly magnified the danger beyond reality; that the risk of propagating the contagion in this manner is by no means so great as had been supposed; and that physicians, or even apothecaries, are seldom so long exposed to this atmosphere, as to be in great danger of conveying the contagion elsewhere; but I cannot go so far as to believe that the persons, and especially the clothes of nurses or assistants, who are constantly

stantly confined in the chambers of the sick, sometimes not very well ventilated, will not imbibe the contagious vapour to such a degree, as to be capable of communicating it, especially where they have a direct or immediate intercourse with a person susceptible of the disease. But, putting the small-pox and other *specific contagions* out of the question, that the jail distemper and *putrid contagions* are frequently conveyed in this manner, cannot be denied. Indeed, wherever a vapour can be distinguished by the smell, we have the demonstration of our senses for what a length of time, not only clothes, but furniture, and even the boards and walls of houses will retain it : therefore, in respect to the contagion of the jail or hospital fever, we may safely affirm, that it affects not only those who are immediately exposed to the original atmosphere, but that this contagion may certainly be communicated by the clothes of persons who have
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for any length of time been confined in it ; and, what is still more surprising, even when the persons themselves have suffered no injury, nor had any disease in consequence.

This fact being ascertained, we cannot wonder if those who are seized with the jail fever, owing to such communication, should during their illness generate a contagious vapour ; but, however paradoxical it may appear, I have never observed that the sick propagated the disease so readily, as the bodies and clothes of those who, though well, had been long confined in the original atmosphere. From my own experience also, I am led to conclude, that there is little risk of receiving the contagion from dead bodies, even from dissecting them, provided the surgeon does not cut himself during the dissection, the consequence of which has generally proved fatal.

There are several other circumstances, worthy of notice, that increase or diminish

nish the facility with which contagion is communicated. Unless where contagion is very powerful, it is seldom propagated in the open air ; I knew only one instance of this at Winchester. It is much more certainly communicated in a room, and especially if there is a current of air, from the contagious person to others capable of being affected. A moist atmosphere is also more favourable to the communication of contagion than a dry one. A contagious person becomes greatly more so, if his clothes are wet, and his body heated by exercise, so as to be in a state of perspiration. Those most susceptible of contagion are, young persons, particularly if they come directly from a pure air into the infected atmosphere ; persons whose minds are oppressed with fear or anxiety ; or who have been weakened by previous illness ; even those who have been fatigued, or are fasting, more readily than others whose strength has not been impaired,

paired, or which has been again recruited with food. It has been farther remarked, that persons who have issues are seldom affected by contagion.

Of the Effects of putrid Contagion on the human Body.

PUTRID matter, in whatever way generated, if in sufficient quantity, has always some deleterious effect; or, in other words, acts as a poison upon the body. It is true, that the human stomach, and still more remarkably, the organs of digestion of certain animals, have the power of counteracting the septic tendency; but this power, in our stomachs at least, is very limited; and when any matter, whether generated in the body or introduced from without, has acquired a degree of putridity beyond this, it occasions nausea, vomiting, purging, great op-

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pression

pression at the region of the stomach, and often a fever, either of the intermittent, remittent, or more continued kind. Putrid matter, directly introduced into the system by means of a wound, causes swelling and inflammation of the lymphatic glands, often terminating suddenly in gangrene, along with the symptoms of a fever, greatly resembling the hospital or jail fever: the same prostration of strength, tremors, anxiety, headach, and delirium; with the same irregularity in the pulse, and, if the disease continues, it induces those appearances of the skin, hemorrhages, and other symptoms, that indicate a relaxation of the solids, and resolved crasis of the blood. The fevers that arise in consequence of exposure to putrid vapour or contagion, assume a variety of types and forms, according to the various circumstances of combination, degree of putridity, season of the year, constitution of the patient, &c. But they, as well as the preceding, will be found

found to have many symptoms in common, and similar to the jail and hospital fever : and in reality all the fevers of this class, from the slightest vernal intermittent to the true plague, are only different shades or varieties of the same disease, and productions of one common cause, viz. putrefaction. I shall not however prosecute this subject farther at present, as I have treated it more fully in another work, which, should I hereafter have leisure to complete, I hope to render not altogether unworthy of the public eye.

The contagion then of the jail or hospital fever, may justly be considered as one of the most subtil and powerful vapours of the putrid kind; and, consequently, its immediate and destructive effects upon the body are not to be wondered at. In ordinary cases of fever, the vital principle is roused into action, and Nature is commonly sufficient of herself to remove the morbid

cause; but here, as in the real pestilence, the contagion introduced into the body, seems to act as a narcotic poison upon the heart and nervous system, suppressing the principle of life, instead of rousing it to the conflict. In this distemper therefore, where nature can do so little, and even art, unless immediately called to her assistance, is equally unavailing, it is of the utmost consequence for us to know whether the contagion cannot be prevented or destroyed.

*Of the Means of preventing, and of destroying,
the Jail Contagion.*

As we are perfectly acquainted with the causes of the jail contagion, we could certainly prevent its formation, provided the means of doing so were always in our power; but as we cannot command these, our next object is to endeavour to correct, or destroy it, when formed. - As a knowledge of the
nature

nature and origin of the jail contagion naturally led to the proper and effectual means of correcting or destroying it, so, on the other hand, the means that have been successfully employed to destroy it, afford the most convincing evidence of its true nature. Every species of contagion has its virulence lessened, and is at last completely effaced, by exposure to the open air. Whether the atmospheric air has the power of dissolving contagion, (according to Dr. Haygarth) or only diffuses it, in such a manner as to render it harmless, cannot possibly be ascertained, nor is it of any importance to know. Water possesses the same power as air, and may be employed with equal success, in removing contagion from clothes or furniture. In respect to *specific contagions*, unless it be exposure to the open air, or to a stream of water, we know no means of destroying them, or even of blunting their activity. The case is not the same with putrid

contagions ; whose virulence is often blunted, or the contagion entirely destroyed, by certain degrees of heat or cold. There are likewise many vegetable and mineral substances, which possess the power of resisting or counteracting putrefaction ; but as these, in general, can only be employed in a solid or liquid form, they can be of no service in destroying a putrid vapour, which cannot be acted upon but by antiseptics in the same state. Many things have been used for this purpose, but the history of those trials, and a more accurate knowledge of chemistry, are sufficient to convince us of their inefficacy. My attention having been particularly called to this subject, and my character involved in the success, I was satisfied, after the most deliberate reflection on the nature of putrid contagion, that nothing could so certainly or efficaciously destroy it, as the mineral acids in a state of vapour ; but how to employ these, with safety, was the difficulty—*Hoc opus, hic labor, The fumes*

fumes of sulphur, which are so successfully made use of to fumigate clothes or furniture, could not be employed, either in hospital or prison wards ; as these fumes are well known, even in small quantity, to prove immediately destructive to animal life. I had frequently remarked, that the fumes of the nitrous acid, did not affect the breathing in the same manner, notwithstanding which, I conceived they might prove of equal efficacy in destroying or diminishing the virulence of contagion ; and the success attending the employment of these at Winchester, as well as many trials which I have made, both in private and in the Middlesex hospital, have convinced me of the power of the nitrous acid, in destroying contagion, and likewise of the safety with which it may be used. But, as I purpose to give a more full description of this matter in the Appendix *, I shall now proceed to relate the means

* Vide Appendix,

employed by me at Winchester, to destroy the contagion in the prison, and for the cure of the sick in the hospital.

Treatment of the Prisoners, and Means employed to purify the Prison and Hospital Wards.

UPON my arrival at Winchester, the first object that seemed to claim my attention, was the enlargement of the hospital; which I found could easily be accomplished, as there were several empty wards adjoining, that might, in a few days, be fitted up for the reception of the sick. I therefore gave orders that this should be immediately done; at the same time, to insure the free admission of air, so necessary for their recovery, I directed that the casements of most of the windows should be removed, and the windows leverboarded *; that the chimneys in

* The name given by the tradesmen to a coarse kind of Venetian window-blind.

the different wards should be contracted into narrow flues, and a fire kept constantly in each ; and that, close to the cieling, circular openings should be made in the walls separating the different apartments, which would allow an uninterrupted circulation of air through the whole, now capacious enough, with the proposed addition, to contain three hundred men. But, whilst I was engaged in this most necessary work, my attention was called off, by information I received of the sick list increasing so rapidly that, unless some check was given to the contagion, the addition made to the hospital, and twice as much, would soon be insufficient for the accommodation of those who were daily seized with the distemper. I now perceived, that I had begun at the wrong end of the business ; that it was necessary to give my first attention to the prisoners, and, although I might not immediately succeed in destroying the contagion, I must at least endeavour

your

your to lessen the violence of it ; that, this being done, I should have room enough for the sick, and sufficient leisure to attend to them. I therefore, after again examining with attention the prisoners and prison wards, adopted the following plan.

I divided the whole of the prison wards into four parts ; and, lodging the prisoners, which could easily be done, in three of those parts, I set aside the fourth for the purpose of purification, which was conducted as follows :

After removing all the hammocks, bedding, &c. from the wards, they were first thoroughly cleaned out ; then the hammock posts were well washed with diluted marine acid, and the same thrown, by means of garden watering machines, to the upper parts of the posts, as high as the cieling. The wards, when dry, were closely shut up, and pots placed in them, at different distances, containing from half a pound to a pound of nitre, which was deflagrated

deflagrated by an iron heater, put into each pot. The wards were then shut up for some hours, and, when opened, were exposed to a free ventilation. After this process had been once or twice repeated, the wards were again furnished with fresh hammocks, palliasses, and bedding, instead of the old bedding, &c. which was entirely taken away. Having thus prepared the wards, I ordered as many of the prisoners, as could be lodged in them, to be taken to the river in companies, about one hundred at a time. They were there stripped, washed, and new clothed: all their old clothes being carefully removed, they were brought back to the prison, and lodged in the prepared wards. The good effects of this plan, so far as it could be carried into execution, was immediately felt; as none of the prisoners*, so managed, were afterwards seized with the

* About three hundred.

distemper;

distemper; but, as we could not procure a sufficient quantity of fresh clothes and bedding, we were obliged to supply this defect by fumigating and purifying those which we had taken away, and delivering them again to their owners.

We employed the new clothes and bedding for the second division, as we had done for the first. The third division of the prisoners was treated in the same manner, and the same means were employed for purifying the different prison wards; the effects of which, in effacing the contagion, appeared directly, from the great diminution in the number of the sick *. Fearing, however, that the distemper might again break out amongst them, from some latent seeds of contagion still adhering to the clothes or bedding, I desired that the prisoners should every morning be reviewed, and particularly examined respecting their health, by their

* Vid. Hospital returns. Appendix.

own surgeon ; and, as the Spaniards were by this time sensible of the attention paid to them, and already experienced the good effects of it, they now of themselves (what at first could not be obtained without compulsion) took out their hammocks every day to the airing ground, and, when the weather would admit of it, exposed their * bedding to the open air during the greater part of the day. I had also a shed erected for their walking under when it rained, and a ward or two set apart for their dining, and did not suffer them to enter the wards where they slept, until the evening ; taking care to have these wards fumigated, and well ventilated every day.

Having finished with the prison, and prisoners, I again returned to the hospital, and found the seven new wards, which I had ordered to be fitted up, ready for the reception of the sick : they were, in part,

* I had drying posts and lines put up in the airing ground for that purpose.

furnished

furnished with new beds ; but, as we had not a sufficient supply of these, we were under the necessity of using some of the old ones ; those however I took care to have first fumigated, then washed with hot soap suds, and afterwards with diluted marine acid. When every thing was properly prepared, in these new apartments, I had such of the sick as could without danger be removed brought into them ; and, by this means, emptied some of the old hospital wards ; which with the beds and bedding, were immediately fumigated, cleaned out, and prepared in the manner already described. Proceeding in this way we, in a few days, got the whole of the hospital put into a proper condition : and, when any of the sick died, I ordered that the bed and bedding should always be removed, and not employed again until it underwent a fresh fumigation and cleaning. The not having attended to this necessary precaution, had certainly been destructive to many ; the
beds

beds and bedding proving fatal to those who were put into them.

Of the Cure of the Jail Fever.

BEFORE I make any observations on the proper method of treating this fever, I shall transcribe some directions given by me to the Spanish Surgeon, as well as to our own, with the general regulations laid down respecting the hospital.

Directions to the Spanish Surgeon.

THE Spanish surgeon is requested to review the prisoners every morning ; when any man seems indisposed, to examine particularly his complaint : and if there is reason to apprehend that he is affected by the contagion, he is immediately to be treated in the following manner.

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He is, first, to have the common purging glyster administered ; after the operation of which, he is to take the emetic mixture every ten minutes or quarter of an hour, until it has had a proper effect ; at going to bed, the *bolus antim. cardiac*, with a basin of mutton broth, or ptisane. If, next morning, the symptoms of fever have in great measure disappeared, he is to be treated as a convalescent, and, as such, must take, twice or thrice a day, the *haustus ecort. peruv.* He is to have a glass of wine after dinner ; his diet to consist of broth or rice ; and no meat nor cheese to be allowed, until he is perfectly recovered. If the symptoms of fever should continue, or increase, after this treatment, the sick person is then to be sent to the hospital, and delivered over to the care of the hospital surgeon.

Directions

Directions to the Hospital Surgeon.

WHEN a man is brought to the hospital with the symptoms of the jail fever, he is, in the first place, to be sent to the bathing room, and bathed for ten minutes in water, at the temperature of 100 of Fahrenheit's thermometer; all his clothes are to be removed to the fumigating house; after bathing, he is to have an hospital shirt put on, and, being wrapped up in a blanket, must be conveyed to the hospital, either in a hammock or sedan chair. When put to bed, he is to have the common glyster administered, and afterwards is to take the tartar emetic solution, unless where that medicine has been previously given by the Spanish surgeon, conformably to his instructions. Soon after the operation of the emetic, or immediately, where that has been already

* I had a bathing room, with two hot baths, connected in the hospital at Winchester.

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given,

given, he is to take the *bolus antimon. cardiacus* *, with four spoonfuls of one or other of the mixtures, N° 7 or N° 8 ; and these medicines are to be repeated (varying them according to the symptoms) every four or six hours. It may perhaps, in some cases of extreme weakness, or in the second stage of the disease, be adviseable to substitute the peruvian bark, in some of the forms subjoined †, instead of the above mentioned antimonial medicine, &c. but this is left to the judgment and discretion of the surgeon. I will only suggest, that where extreme debility, or the tendency to gangrene require the bark, we are not to expect or wait for an intermission or remission of the fever. The bark, in such cases, may always be safely administered, if the tongue is not parched, nor the skin dry, when there is no difficulty of swallowing, nor the breathing much

* Vid. Appendix. Form. medicam.

† Vid. Idem. eodem.

oppressed.

oppressed. But, under those circumstances, I think it neither safe nor useful, and would most undoubtedly prefer the medicines of the class first prescribed. Wine is proper in most stages of the disease, unless where the inflamed appearance of the eyes, with a flushed countenance, and the violence of the patient, give reason to apprehend a phrenzy, or inflammation of the brain, when wine aggravates the symptoms, and perhaps hastens the fatal termination. But, where wine is proper, it should never be left to the discretion of nurses, but administered either by the surgeon himself, or by the dispenser, who may, with very little trouble, give it to the sick in his daily rounds ; distinguishing also, by this mark of attention, those men who are well behaved and orderly, from the disobedient and refractory. Mutton broth may be indiscriminately allowed to all the sick who choose it ; but the strength of it should be proportioned to the state of the patient. I would advise the having three

different kinds of broth, or rather, to have broth of three different degrees of strength ; the surgeon will then direct the broth most proper for each patient. Blisters, applied to the back, may possibly be of advantage, in cases of inflammatory delirium ; but they should not be rashly or indiscriminately used : they should be looked upon by the surgeon more as a symptomatic, than a general remedy. In cases of violent or involuntary purging, the bark and antimonial medicines must either be entirely laid aside, or given along with *theriacal philonium*, or some other opiate. It is always of advantage to keep the body open, which may easily be done, by a laxative glyster, or by a dose of the purging electuary, given by itself once in twenty-four hours, or administered, in smaller quantity, with the *antimonial bolus* every six or eight hours. The drink of the sick should be marshmallow tea *, or any other

* The Spaniards were particularly fond of this.

ptifanne, acidulated with the marine acid, toast and water, or lemonade, to which a few drops of the marine acid may occasionally be added. Those who dislike mutton broth, may have boiled rice for their food.

*Regulations respecting the Hospital Wards
and Bedding.*

THE hospital wards must be carefully swept every morning, and the places under the beds cleaned out with a wet mop; the floors of the wards (after being swept) must be watered, by means of a garden watering-pot, with diluted marine acid; the wards are then to be fumigated with censers of burning saltpetre, and two or three gallipots, about two-thirds filled with fuming spirit of nitre, are to be placed in the middle of each ward, to remain constantly night and day, and to be renewed every morning. The beds themselves are to

be sprinkled with vinegar, and neither the bed, nor bedding, of any patient who dies, or is discharged, is to be again used, until properly fumigated, washed, and aired. Patients who involuntarily, or negligently, soil their beds, must be laid upon palliasses, which may be easily changed every day, or more frequently, if necessary. The nurses of the hospital should be obliged to observe the strictest cleanliness; to empty the soil tubs twice a day, and even oftener, in particular cases. The tubs must be washed out, before they are again used, with diluted marine acid.

*Of the preventive Treatment, or Cure of
the Jail Fever in the first Stage.*

EVERY one who has paid the slightest attention to the history of diseases, must have remarked, that those contagions which I have distinguished by the name of *specific*, do not produce any morbid effect, nor give
any

any evidence of their being present in the system, until some considerable time after their introduction : they must also have observed, that when once received they cannot be expelled, nor the diseases which follow their introduction prevented, by any means hitherto known.

The above circumstances, together with the fact already mentioned, that a person is liable only once in his life to be affected by any *specific contagion*, constitute a very decided and marked difference between them and those I have called *putrid*. Contagions of this class, when introduced into the body, produce in general some morbid effect very early, often in twelve or twenty-four hours, and sometimes, I may say, instantaneously, or almost as soon as applied. It is also observable of *putrid contagions*, that after they have been admitted, and even after they have excited various morbid symptoms, they may be again expelled, either completely, or at least to such a degree as greatly

to lessen their virulence, and the dreadful consequences which would otherwise ensue. This observation is of the utmost consequence, as upon it is founded the first and most important part of the practice in those fevers, and what may justly be named, the preventive treatment, in as much as it prevents the fever from running through its usual course; or it may be called the cure of the first stage, as it is only in the beginning of the disease that this method of curing it is practicable. How far this first stage extends, or what is the duration of the period during which the fever may, with certainty, be removed in this summary way, I cannot pretend to ascertain; I should however imagine, that it seldom exceeds the first four and twenty hours; and that, when the contagion remains in the body beyond this time, it in general has produced morbid effects, which cannot so expeditiously be subdued.

From

From the experience of some of the ablest physicians we learn, that there are three ways of expelling the contagion; the first, by an emetic; the second, by sweating; and the third, by blisters applied to different parts of the body.

The advantage of an emetic, given in the beginning of those distempers, was first mentioned by F. Hoffman; but the superior efficacy of this remedy in the jail fever was fully ascertained by Pringle and Lind.

One practical caution is necessary in respect to emetics, viz. that they should always, if possible, be employed immediately upon the attack of the disease; that afterwards they must be used with caution, and never when the contagion has excited vomiting, or rendered the stomach extremely irritable. But, although an emetic be the chief means of expelling the contagion, it is seldom alone sufficient for that purpose, and it is therefore necessary to have recourse to sweating to complete the cure.

Sydenham

Sydenham has told us, that he often cured the pestilential fever in his time, by keeping up a perspiration for twenty-four hours; but he has neglected to inform us if this practice was applicable to those fevers in the beginning only, or if it might be employed with safety and success at any period of the disease: an omission which has been fully compensated by the experience and observations of Pringle and Lind, two authors of very great merit, especially on this subject. When sweating is employed, it should be kept up until the symptoms of fever are removed, or at least until a complete intermission is obtained; but in doing so, two cautions are necessary. In the first place, we should never force sweating by any means by which the heat of the body, or quickness of the pulse, can be greatly increased. Secondly, we ought not to persevere too long in keeping up profuse sweating, if we find that it does not afford a sensible relief, or abatement of the symptoms: by the first error, we run a
risk

risk of bringing on phrenitic delirium, with an increase of fever ; by the other, we exhaust our patient unnecessarily, when it is apparent that the disease is too much fixed to be removed in this manner.

The third method of removing contagion, is by the application of blisters. This is a discovery of Dr. Lind's, and the fact rests as yet entirely upon his authority. Not having read Dr. Lind's pamphlet on contagious fevers for some time before I went to Winchester, and not recollecting what he says of the great advantage of blisters in the beginning of such fevers, I had, judging likewise from my own experience, adopted the sentiments of Pringle and Huxham on this subject ; but I have so high an opinion of the great candor, as well as of the great experience of Dr. Lind, that, although I am still of opinion that in the more advanced stages of this disease blisters are of little efficacy and not without danger, and ought therefore
not

not to be rashly employed, I think it not improbable that in the beginning they may be used with advantage, and the discharge give an outlet to the poison ; but in whatever way we explain the fact, the authority of Dr. Lind warrants the trial, especially as it does not in the least interfere with the other means, whose efficacy is already established.

I have taken no notice of change of air, which is mentioned by Pringle as one of the means of removing contagion, as it must be a slight infection indeed, where such means can be effectual ; and surely no man in his senses would think of trusting to it, knowing that he had more efficacious and certain remedies in his power.

Besides the three methods of expelling the poison which I have just now related, there are two other circumstances which should not be omitted, and which I look upon as useful, if not necessary parts of the practice, in the first stage of this disease.

The

The first is, the opening the body, or cleansing well the *primæ viæ* : and, for this purpose, the best remedy I know is *calomel*, as being the most certainly efficacious, and from which there is the least risk of doing too much. The second is, bathing the feet and legs, or, what is preferable, the whole body, in warm water : a practice particularly requisite for soldiers and sailors, as it washes away any remains of contagion adhering to the surface of the body, removes the coldness of the extremities, and, by relaxing the skin, renders it more transpirable, and at the same time relieves the anxiety at the præcordia. But though putting patients into warm water is attended with many advantages, it requires some caution : care must be taken that the bath be of a proper temperature, and that the sick do not remain too long in it.

When, from employing the whole, or any part of the preventive method of cure, we succeed in removing the symptoms entirely,

tirely, or in bringing on a complete intermission of the fever, the return of this is to be prevented by the free use of the bark ; and the health of the patient is to be restored by the usual methods, viz. by tonics, gentle exercise, change of air, &c. But, when the preventive method has proved ineffectual, either in abating or removing the disease, we may look upon the fever as now formed, or advanced to the second stage, and consequently recourse must be had to other modes of treatment.

On a subject, however, where there has been such a variety of opinions, it may not be improper, before delivering mine, briefly to enquire into those of the latest and most eminent physicians.

The

*The Opinions of different Authors, respecting
the Cure of the Jail and other contagious
Fevers.*

ALTHOUGH physicians have differed greatly respecting the particular mode to be pursued in the cure of the jail fever, they concur in opinion as to the principle upon which the cure of fevers in general is to be attempted. They acknowledge that this is to be looked for not so much from art as from nature ; that is, from the efforts of the constitution, or those motions excited in the living principle, which, though sometimes destructive, are evidently intended for the preservation of animal life. That the business of the physician is to regulate those efforts, to prevent them from being too active or violent, on the one hand, or too remiss and oppressed, on the
the

the other ; and to obviate the dangerous or troublesome symptoms which usually occur in the course of the disease. Such has been the general intention, or what is commonly called, indication of cure in all continued fevers, from the age of Hippocrates to the present time. How far physicians have adhered to this principle, in their treatment of contagious or malignant fevers, I shall now examine ; beginning with Sir J. Pringle, an author of considerable merit, especially on this subject, and whose practice does not greatly differ from that of Huxham and Lind, physicians who also stand high in the public esteem, whose writings are in the hands of every practitioner, and whose mode of treatment has been very generally adopted in this country.

Although the jail fever has no regular periods, Pringle has divided it into three stages. Of the first, which seldom extends beyond twelve or twenty-four hours, I have already spoken ; the second continues

times until the pulse sinks ; the third commences when both pulse and strength fail ; at which time the patient most commonly is affected by coma or delirium. As the efforts of the constitution, in the beginning of continued fevers, have in many instances been found too violent, and in danger of bringing on local inflammations, bleeding has been a very general practice ; it has been recommended by Pringle * and by Huxham †, in the jail fever, and by many, even in the real pestilence. This practice, from whatever authority it comes, I must condemn, as highly injudicious, hazardous, and often fatal : nothing surely can be more absurd than to use any means

* In the second state, when the fever is manifest, with a quick and full pulse, it will be proper to bleed, if not done before. Vid. Pringle, p. 315.

† Though malignant and pestilential fevers, at the very onset, greatly sink the spirits, and cause surprising and sudden weakness, especially when from contagion, yet bleeding, to some degree, is most commonly requisite. Vid. Huxham's *Essays on Fevers*, p. 104.

to diminish the strength of the body, when we are certain that, sooner or later, the strength will fail and require being supported; and when, though the pulse may not be very sensibly sunk, there are the most evident signs of debility and dejection. It is true that here, as in every other fever, local inflammations sometimes happen, but can those * inflammations be prevented, or are they to be cured by bleeding? Does any physician of this country now think of having recourse to the lancet, to cure the inflammation of the fauces in the scarlet fever, or what is called the putrid sore throat? Are there not likewise many instances of erisipetulous and membranous inflammation, where bleeding is pernicious or fatal†? But I leave the reader to form

* The word inflammation, comprehending diseases of very different natures and terminations, has been a source of great mistakes in the practice of physic.

† Vid. an Essay on Inflammations, in the 2d volume of the Medical Communications.

a judgment of this practice, from what those gentlemen themselves have written on the subject.

Sir John Pringle observes, that “ in
 “ inflammatory fevers, bleeding constantly
 “ moderates all the symptoms, but in this
 “ (the jail fever) it seldom has that effect.
 “ The first bleeding, if moderate, little af-
 “ fects the pulse; but if the evacuation be
 “ large, and especially if repeated, (to answer
 “ a false indication of inflammation) the
 “ pulse increasing in frequency is apt to sink
 “ in force, and often irrecoverably, whilst
 “ the patient becomes delirious: and even
 “ in every case, independent of evacuations,
 “ the pulse sooner or later sinks *. Many
 “ have recovered without bleeding, but few
 “ who have lost much blood †.”

Let us next hear Huxham on this sub-
 ject. “ Contagion certainly weakens the

* Vid. Pringle on Diseases of the Army, 8vo. edit.
 p. 298.

† Id. p. 315.

“ force of the solids, and tends to dissolve
 “ the blood ; so that when we have a sus-
 “ picion that a fever arises from contagion,
 “ we should proceed with caution in letting
 “ blood, even though the symptoms may run
 “ pretty high at the beginning, and seem to
 “ demand the taking of a pretty large quan-
 “ tity, &c. and therefore, though the first
 “ bleeding may be proper, the subsequent
 “ may not be so ; nay, pernicious *. The
 “ pulse in these cases sinks oftentimes sur-
 “ prisingly after a second bleeding, nay
 “ sometimes after *the first*. And this I have
 “ more than once noted, to my great as-
 “ tonishment, and that even where I thought
 “ I had sufficient indications from the pulse,
 “ &c. to draw blood a second time †. The
 “ first blood frequently appears florid ; what
 “ is drawn twenty-four hours after, is com-
 “ monly livid, black, and too thin ; a third
 “ quantity livid, dissolved, and sanious ‡.”

* Huxham on Fevers, 3d edit. [p. 108, 109.

† Ibid. p. 109.

‡ Ibid.

Unless

Unless we had the evidence of Dr. Huxham himself on this subject, we should scarcely have believed it possible that he could have ordered repeated bleeding under such circumstances ; but so difficult is it, even for the strongest minds to get rid of early prejudices, though their own experience shews the falsehood of them every day. The truth is, that the pulse, from which those gentlemen took their indication of bleeding, is always irregular, and never to be depended upon in this fever ; that from the smallest quantity of blood taken away, the strength often sinks irrecoverably, and that bleeding, even supposing it to do no mischief, is not effectual, either in preventing or in curing the phrenitic delirium, and other symptoms of local inflammation, which sometimes occur. I may also add, that the greater number of instances of phrenitic delirium which I have met with, either in this fever, or in the putrid sore throat, were evidently the consequence of

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improper

improper treatment in the beginning ; and therefore must protest, so far as my feeble voice can go, against the use of the lancet in the jail or hospital fever, and indeed in every other, when accompanied by what are called malignant symptoms, which are caused by the higher degrees of putrid contagion.

After bleeding, both Pringle and Huxham recommend cleansing the primæ viæ, by a vomit and gentle purge. I have already mentioned the great benefit to be derived from an emetic, given upon the attack of the disease ; but when the fever has continued beyond what I, after Pringle, call the first stage, the use of an emetic is then more equivocal, especially if the stomach, as is often the case, has become so extremely irritable as to reject every thing taken in ; but if, along with this great irritability, there is a sense of burning heat and pain at the præcordia, with or without hiccough, and still more, if with these symptoms there is an aphthous appearance in the mouth, no physician

physician in his senses would think of administering an emetic, or of irritating the stomach, even with camomile tea *. A saline draught in the act of effervescence, absorbents, mucilages, and opiates, are at this time the chief medicines to be employed.

In respect to purging, I shall only observe that, as the keeping the body gently open is a useful practice in every fever, it is particularly so in this, where the great oppression at the region of the stomach must be considerably aggravated from spasms, or flatulency in the bowels. At the same time I have always remarked, that the sick in this fever do not bear purging any more than bleeding; I have seen patients sink even from the operation of a glyster †.

* The medicine ordered by Pringle.

† I have sometimes observed persons in low fevers more sunk from the evacuation caused by a glyster, than from two or three stools in consequence of any medicine taken by the mouth. What the reason of this may be, I will not pretend to say; but of the fact I am certain, and therefore I never order purging glysters in these fevers, except in the beginning.

After clearing the first passages, Sir John Pringle confined his practice in the second stage to promoting a diaphoresis, by the mildest medicines of the sudorific class. His own words are : “ The next care is to
 “ promote a *diaphoresis*, which in this state
 “ of the fever is to be attempted only by
 “ the milder sudorifics, and for this purpose the *spiritus mindereri* has been
 “ used *.”

His observations respecting sweating have always appeared to me extremely judicious, and have been confirmed by the concurring testimony of the ablest physicians, in all ages and countries.

Again †, “ As soon, therefore, as the
 “ distemper is confirmed, I give such
 “ medicines only as were recommended
 “ before in the cure of inflammatory fevers ; viz. the *contrayerva* powders, with
 “ nitre and camphire, and the common
 “ ptisan acidulated with vinegar.”

* Vid. page 317.

† Vid. p. 318.

It must strike every one who reads this, as a strange inconsistency, that the same medicine should be employed in two fevers so directly opposite to each other ; for we surely have reason to suppose, that a medicine which is of service in an inflammatory fever must be hurtful in a jail fever, where the indications of cure are so extremely different ; but Sir John Pringle has in some measure explained this apparent contradiction, by telling us that he never saw any effect from the medicine, and therefore it might suit one fever as well as another. He says, “ upon the whole, it “ was a medicine which had little sensible “ effect, and therefore I laid the less stress “ upon it.” To be sure, when we consider what the medicine was, we must be satisfied that its effects could not be great : it consisted of ten grains of nitre, seventeen of an absorbent powder, three of camphire, and about three of contrayerva. The last article appears to me
to

to be very ill suited to an inflammatory fever, and in too small a quantity to be useful in a putrid one; whereas nitre *, which is found useful in inflammations, if in so small a dose it could have any effect, appears an improper remedy for the jail distemper.

Sir John Pringle was himself so much aware of this, that in the third stage of the disease, or when the pulse sunk, with petechiæ, delirium, or coma, he omitted the nitre, and introduced powder of snake-root; or, instead of the powder, gave a decoction of the snake-root alone: and at last, as the highest improvement of his

* The practice of giving nitre with camphire in contagious fevers seems to have prevailed very generally, but whether physicians have been led into this practice from any particular reasoning on the qualities of the medicines, or from their experience of the utility of such a combination, I cannot take upon me to say; but, judging from the general effects of nitre, it appears to me an ill chosen medicine for such a disease.

practice,

practice, and the final result of his experience, he gave a decoction of bark with snake-root; though even with this medicine, he tells us, that he lost one in ten, when the disease was mild, and the places where the sick lay were well aired; and that where the disease was more violent, he lost one in five. A degree of success, which does not greatly encourage us to adopt his method of cure. Besides the decoction of snake-root and bark, Sir John Pringle gave occasionally a cordial mixture, made of the confectio aromatica and volatile alkali. He also gave wine, the praises of which in this fever, he justly celebrates.—

“ So great,” says he, “ is the virtue of
 “ wine in this stage of the fever, that I
 “ have known many recover from the
 “ lowest condition, when, refusing the de-
 “ coction on account of its taste, they took
 “ nothing but a little panada with wine,
 “ and the volatile mixture, every two or
 “ three hours by turns.”

What

What he afterwards subjoins, respecting the necessity of the patient taking frequently some nourishment or support, and what he repeats, after Hoffman, of the danger of an erect posture, are the observations of a judicious practitioner, and apply to every case of extreme weakness, and more especially to that which occurs in putrid fevers of all kinds.

Sir John Pringle's symptomatic treatment regards principally the phrenitic delirium and diarrhoea: for the first, he advises leeches to be applied to the temples, though he does not say that he has ever seen them of service; and a blister to be put upon the back, although, unless for this particular symptom, he has no opinion of the utility of blisters. For the diarrhoea, he prescribes what is commonly used, the chalk mixture with laudanum, recommending to check this symptom only, not to stop it entirely. In cases of phrenitic delirium, he omitted wine, and the decoction

portion of bark with snake-root, and had again recourse to the contrayerva powders with nitre. His remarks on convalescents have nothing new in them, excepting the singularity of his belief, that patients might recover after a portion of the substance of the brain had suppurated.

Dr. Huxham's practice in this fever differs but little from Sir John Pringle's. Besides keeping the body open, he advises purging the patient gently, on the eighth or ninth day of the disease; he employs not only the vegetable but also the mineral acids; and rejects entirely the use of volatile alkali and blisters, unless where their stimulus is required. His principal medicines to promote a diaphoresis are, camphire with vinegar, and sometimes with opium, as in the paregoric elixir; or theriaca. In the last stage of the disease, he gave the Peruvian bark, especially that tincture of it which long went by his name, joined with elixir of vitriol. He recommends
strongly

strongly the use of wine, particularly port wine, with lemon or orange juice.

Dr. Lind, physician to Haslar hospital, whose excellent observations on contagious fevers justly entitle him, had he done nothing else, to the gratitude of posterity, enforces, in the strongest terms, the preventive practice, or method of removing this fever in the beginning, by an emetic and subsequent sweating; the vomit he employed was a very gentle one, from six to ten grains of the powder of ipecacuanha; to excite perspiration, he prescribes five grains of the salt of hartshorn, united with fifteen or twenty drops of laudanum, or with five grains of camphire, every four hours; drinking large draughts of vinegar whey. But what chiefly distinguishes Dr. Lind's practice, is the use he makes of blisters, and the success or advantage which he found in this fever from their early application. It may be proper to quote his own words. "Where the proof
" of infection is evident, (after premising a
" vomit,

“ vomit, &c.) recourse must speedily be
 “ had to blisters ; these are to be applied
 “ to the back, if the head or limbs are af-
 “ fected, and to the breast, should the pain
 “ have seized that part. I do not know a
 “ surer mark of a prevailing infectious
 “ fever, than that, of twenty patients to
 “ whom it has been communicated, and
 “ who were blistered at night, sixteen will
 “ next morning be entirely free from heat,
 “ headach, pain, and fever *.”

In respect to bleeding, Dr. Lind is of my
 opinion. “ This operation (viz. bleeding)
 “ is always dangerous, in proportion to the
 “ virulence of the taint ; fevers highly
 “ malignant will not bear bleeding †.”

After some general reflections on the
 use of antimonial medicines in fevers,
 he says, “ Antimonials should be exhi-
 “ bited in small doses, frequently repeated.
 “ I often add four or five grains of cam-

* Vid. Lind on Fevers and Infections, p. 68.

† P. 70.

“ phire

" phire to each dose, at other times nitre
 " in like quantity. When antimony
 " ruffles or purges, it should be admi-
 " nistered in boluses of confect. cardiaca,
 " electar. e scordio, or even philon. lond.
 " and in cases of great lowness, with the
 " addition of five grains of sal corn. cervi."

He also recommends in low fevers, an in-
 fusion of contrayerva and snake-root, with
 some camphire, or distilled vinegar, and
 sometimes rhenish wine.

Amongst the eminent physicians of the
 present century, may be reckoned Boerhaave,
 Van Swieten, and Fred. Hoffman. Of the
 two first, it may be said with truth, that
 they had no knowledge of the disease in
 question. Boerhaave makes no mention of
 this particular fever, and what Van Swieten
 has written on the subject of epidemics
 and exanthemata, particularly respecting pe-
 techiae, shews that he was as ignorant as
 Sydenham of the nature of this symptom. As
 for Fred. Hoffman, one of the first practical
 physicians

physicians that this or any age has produced; he not only describes the disease * with accuracy, but his method of treating it deserves our particular notice. From him we learn the practice, so successfully followed by Pringle and Lind, of curing the fever in the beginning by an emetic and sweating †. The vomit he employed was two grains of tartar emetic in an ounce of elderflower water, and as much of that of *carduus benedictus*. To promote sweating, he gave calcined hartshorn, diaphoretic antimony, nitre, camphire, &c. He either rejects bleeding entirely, or is extremely cautious in using the lancet. He censures the use of heating cordials, or what are called alexipharmics, in the beginning of the disease; recommends the diaphoretic antimony, with absorbents, nitre, and camphire, for promoting a diaphoresis: but he seems to have

* Vid. Hist. feb. petech. in princip. Mund. grassantis. p. 88.

† Vid. Tom. ii. p. 92. Observ. vii.

placed his chief reliance on gentle purges, and on the liberal use of acids, not only the vegetable, but also those of the mineral kingdom ; and likewise on the free use of wine, particularly of rhenish wine.

Amongst the physicians of the last century, our countryman Willis has described this disease very accurately, and has also related a striking instance of it which, in the year 1643, appeared both in the king's as well as in the parliament's army at Reading. His method of curing this fever, consisted in the judicious employment of evacuations, and of alexipharmics ; the first, as he justly observes, lessens the fever, but increases the effects of the poison ; the other, by sweating, expels the poison, but is apt to increase the fever. In describing the fever at Reading, he says, “ *Durante*
“ *canicula hic morbus usque infestus, non uti*
“ *febris, sed velut mitior pestis tractari, &*
“ *remediis tantum alexipharmacis expugnari*
“ *cæpit, phlebotomia huic usque fatalis cre-*
6 “ *dita*

“ *dita est : vomitoria & purgationes interdum, licet non ita crebræ, usui fuerunt ; potissima autem medendi ratio in alexiteriis, & diaphoresi tempestive procuranda, statuebatur **.”

In the writings of Sydenham there is not, properly speaking, any account of a jail fever ; unless we consider the pestilential fever, which prevailed in London after the plague, as a disease of the same kind : this Sydenham cured either by immoderate bleeding, or by exciting, after a moderate bleeding, profuse sweating for twenty-four hours. The bleeding patients *ad deliquium animi*, a practice which he strongly recommends in this disease, with the various instances of success which he adduces, and the authorities he quotes in support of this method of cure, as much surpass my comprehension, as they do my belief ; this treatment is so contrary to our opinion

* Vid. Willis de febre. cap. xiv. p. 114.

of the disease, and to the experience of the most distinguished physicians, for nearly three hundred years. But, be the observations of Sydenham true or false, I imagine few practitioners will be found of sufficient hardiness to imitate his example.

Upon the continent of Europe, there were many physicians of great eminence and professional merit, both in the sixteenth and seventeenth centuries, who have written on this subject, whose observations throw great light on the nature of the disease, and from whose practice much may be learned. The principal of these are Fracastorius, Forestus, Riverius, Mercatus, Zacutus Lusitanus, Mindererus, &c. But I do not intend to encroach farther on the patience of the reader by examining their practice in detail; for the generality of persons I have perhaps already entered too minutely into this enquiry; for others, who wish on this, as on every subject, to form an opinion for themselves, they will probably

probably examine the authors I have quoted, and I can venture to assure them, that they will be very well rewarded for their trouble. They will find many useful and necessary cautions respecting the too liberal and indiscriminate use of the lancet; they will observe that those physicians in general preferred taking away blood by cupping or by leeches; that they recommend the use of the gentlest purges, such as tamarinds, manna, syrup of roses, &c.; that they are always afraid of diminishing the strength of the patient, at the same time are sensible of the danger of heating the body by the improper use of cordials, &c.; they agree in the utility of wine, but are aware that, improperly administered, it may, like other cordials, be prejudicial. They concur in praising acids, especially those of the vegetable kingdom, as vinegar, lemon, and orange juice, forrel, &c. and they likewise often employ the vitriolic acid. Their principal alexipharmics are vegetable

acids, astringents, aromatics, absorbent powders, boles, &c. &c.; some recommend contrayerva, all of them camphire and nitre. In their writings, are likewise to be found many useful observations on the various means of obviating or palliating symptoms, by epithegms, embrocations, frictions, ointments, plaisters, &c. and upon the advantage of cold drink; and the cautions necessary to be attended to in indulging the sick in its use. But, for those who wish to know more of the opinions and practice of the physicians of those ages and countries, I must refer them to the authors above mentioned, and shall proceed to describe the method of treating this fever, which, upon the whole, I have found most successful, and have therefore adopted for many years past.

of

*Of the Treatment or Cure of the Jail Fever
in the Second Stage, or when the Disease is
established.*

THAT the mischief arising from a contagion or poison introduced into the habit, can only be remedied by expelling the poison, or by counteracting its effects, is a self evident proposition. I have already shewn how putrid contagion may, in the beginning, or at an early period of the disease, be quickly expelled. We learn also from experience, that when it has remained beyond that time, and produced certain effects on the body, its removal or expulsion, in this expeditious manner, becomes impracticable, and is therefore no longer to be attempted; the business is now in the hands of nature, and must chiefly be entrusted to the natural powers of the constitution, whose inefficacy indeed we have too frequent cause to lament: at best we are exposed, during the

conflict or course of the fever, to a variety of accidents, which often disappoint our hopes, and sometimes at the moment when we think ourselves most certain of success.

I have already explained how putrid contagion is to be expelled in the beginning by exciting vomiting, and sweating; I have only now to add, that for the first intention I prefer tartar emetic to every other medicine of the kind, both from its acting more powerfully, and from its superior efficacy in bringing on an intermission or remission of fever. I generally, to an adult, give, at first, two grains dissolved in distilled water, afterwards one grain every quarter of an hour, until it produces a proper effect. When its operation is over, I order some gently laxative medicine, unless the tartar emetic solution, as is often the case, has rendered this attention unnecessary. Before the patient is put to bed, he should bathe his feet in warm water, to which a little vinegar may be added; or, if there is

con-

conveniency for it, go into a *semicupium*, or tepid bath, for ten or twenty minutes. To bring on a perspiration, which, after vomiting, is the most important part of the prophylactic practice, I know no medicine so effectual as an antimonial powder, in a proper dose, with twenty or thirty grains of theriaca or mithridate *, to which I commonly add three or four grains of calomel; not that this has any power to occasion sweating, but it clears the bowels more completely than any other medicine, dislodges hardened scybala, or worms, and more certainly procures a complete intermission of fever. To promote the tendency to sweating, some white wine whey, or sage tea, acidulated with a small quantity of vinegar, may be taken about an hour after the preceding medicine, unless where it has caused sickness, when no liquid should be given.

* The *Confectio opiata* is now substituted by the College, instead of these compositions.

The

The perspiration, once excited, must be kept up by tepid drinks, and by a repetition of the antimonial powder, if necessary, until a complete intermission of the fever is obtained; the bark is then to be administered freely, and any remaining symptoms of indisposition are to be removed by blisters, change of air, (especially the sea air, or that of mountains,) warm aromatic purges, such as the tinctures of rhubarb, aloes, &c. taken from time to time, and occasionally an emetic, when the tongue remains white, with a bad taste in the mouth, loss of appetite, and restless nights. But the management of this disease, in the beginning, does not present those difficulties to the physician which occur in the second stage, or when the fever is fixed and established. In respect to the proper treatment of the fever at this period, I have already examined the opinions of many eminent physicians, especially with regard to bleeding; which, in opposition to men of
 very

very high authority, I have ventured to declare not only hazardous, but perfectly inadequate to the purposes for which it has been recommended, as the inflammations that occur in this disease are either erysipelatous or membranous ; at any rate they are not of a kind to be prevented or cured by the lancet *.

I have also expressed my sentiments respecting another evacuation, almost as hazardous as bleeding, viz. purging. I am ready to allow, that this may be employed with very great advantage in the bilious remittent, and in putrid fevers ; but I affirm, that the practice is injudicious and improper in the jail fever ; I have seen it followed by involuntary and colliquative stools, and have great reason to suppose, from what I have more than once observed on dissection,

* I have delivered my opinion still more fully on this subject, in a paper on the distinctions of inflammations, published in the 2d volume of the medical communications.

that

that it sometimes brings on gangrene of the intestines.

I have already also taken notice of the advantage derived from sweating in the incipient state of this disease, but have said that, even then, it should be conducted with caution, and not persevered in, unless followed with an evident abatement of the symptoms. I have farther to observe, that when this first period is over, profuse sweating should never be attempted; for if it does not cure, it weakens the patient; and the means commonly employed to procure or promote sweating, necessarily aggravate the symptoms of fever, and probably induce phrenitic delirium, as I have several times remarked.

Upon the whole, there is perhaps no situation in the practice of physic, where the maxim of "*ne quid nimis*," should be more religiously observed than in the present. But although purging and profuse sweating are both highly improper in the confirmed
state

state of the jail fever, the keeping the body open and the skin moist, where this can easily be done, is at all times highly useful. The great objects, however, of the rational physician, at this period of the disease, are, to moderate the symptoms of fever without diminishing the strength, and to support the strength without increasing the heat of the body or frequency of the pulse; and to answer those complicated and seemingly opposite intentions, I do not know any medicines so proper as some of the preparations of antimony, and the spiritus ætheris vitriolici, or the vitriolic æther itself.

It is not my intention here to enter into the singular and whimsical history of antimony, employed as a medicine, nor to examine the comparative merit of its various preparations; it is sufficient for my purpose, that the efficacy of tartar emetic, and of the celebrated James's powder, in the cure of fevers, is now established upon as firm a basis of experience, and of public opinion,

opinion, as that of the peruvian bark itself, and those gentlemen who have the most extensive practice in warm climates must acknowledge, that they would frequently be disappointed in curing the fevers which prevail there by the bark, were it not for the remission first obtained by the judicious use of tartar emetic. It is not, however, with the intention of exciting vomiting that I would give tartar emetic, or any antimonial medicine, at this stage of the disease; not but that even then it may sometimes be usefully given in nauseating doses; but, in general, unless when there is some particular reason for so doing, it is not necessary to excite nausea; and it is perhaps more prudent to avoid it, as it may terminate in vomiting, and increase the irritability of the stomach, a symptom always troublesome, and sometimes dangerous. I have seldom therefore given tartar emetic alone, commonly with the unwashed calx of antimony, &c. according to the form in the Appendix *: I have

* Vid. Formulæ Medicam.

also

also occasionally and indiscriminately used James's powder, or the pulvis antimonialis of our dispensatory ; there is some difference required in the dose, according to the preparation employed ; but I have not yet discovered any other material distinction amongst them.

The great uncertainty in the operation of antimonial medicines has always been, and still is, a reasonable objection to their use ; they are apt to do either too little or too much ; upon that account, therefore, unless in the beginning of the jail fever, we dare not venture to give any antimonial medicine in a full dose, and in a small one we are liable to be disappointed of the desired effect. To determine their operation to the bowels in a moderate way, and to do this without risk, I generally, to the antimonial powder, add a few grains of rhubarb or of calomel ; when I want merely to procure an evacuation, I use rhubarb, but, where the bowels are foul, or where there
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are symptoms of visceral inflammation, I prefer calomel, giving it once or twice in twenty-four hours. The antimonial powder, thus managed, commonly answers extremely well; it keeps the body soluble, the skin moist, prevents the dryness of the mouth and fauces, and lessens the oppression, anxiety, and sense of heat at the præcordia: if it purges too much, it requires to be corrected by absorbents, aromatics, and opiates; and if these should not answer the purpose, we must lessen the dose of the medicine, or give a less active preparation. And if, notwithstanding these precautions, the antimonial medicine should continue to run off by stool, we must desist entirely from its use. There are two other cases also in which antimonial medicines are improper, either when, from the extreme irritability of the stomach, they occasion sickness and vomiting, or when there is a disposition to profuse sweating. There is a third case also, where

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am doubtful of the propriety of employing them; viz. when they increase lowness and dejection, as I have sometimes observed in women. This, however, is greatly obviated by the spiritus ætheris vitriolici, the other medicine, which, from a long experience of its efficacy, I have ventured to recommend in the cure of contagious fevers.

This medicine has an advantage over most cordials, as it does not increase the heat of the body, or the quickness of the pulse, but, on the contrary, renders the action of the heart more regular and slow. It is also serviceable in promoting a diaphoresis, and in lessening the anxiety, tremors, &c.; but as I have, in the Appendix, reprinted the account I formerly published of this medicine, I shall say nothing more on the subject at present, except to mention the different ways in which I have usually given it.

In cases of fever, accompanied with petechiæ or vibices, and with a disposition to hemorrhage, I commonly give it in the infusum rosæ, two or three drachms to the pint. When there is great heat at the region of the stomach, I prefer giving it in a glass of Seltzer water, either simply, or with a tea spoonful of lemon juice, which makes an effervescent saline draught. Where the stomach is extremely irritable, I give it in an infusion of mint, or of borage, and often in weak negus, made with hock or rhenish wine. Sometimes I give it more largely diluted, as a beverage ; at other times as a medicine, with a smaller proportion of water. In some cases, instead of the spiritus ætheris vitriolici, I give the vitriolic æther itself ; the former, however, is more conveniently administered, and therefore commonly to be preferred. But, altho' I have found the vitriolic æther and the compositions of it generally agreeable to the taste of the sick, I have now
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and then met with persons who had a particular dislike to it, and could not take it in any form: in those cases, I use camphire in its stead, giving the camphire mixture either alone, or with the aqua ammoniæ acetatæ, by which I think its diaphoretic power is increased.

The use of camphire in contagious fevers, and in the plague itself, is almost established by prescription. It certainly often proves a cordial to women. I have seen it likewise disagree with the stomach, particularly when given in substance; but whether it has any particular power to abate or expel contagion, to remove fever, or to resist the tendency to gangrene, is as yet, I think, extremely doubtful. Excepting the medicines already mentioned, I have seldom been under the necessity of employing any other in the second stage of this disease; and, where the fever has been treated in the manner recommended above, the third stage has seldom

occurred ; at the same time, as we may be called to persons in the third stage, in which another mode of treatment becomes necessary, I shall now enquire what are the medicines most proper at this period of the disease.

When the patient is under a permanent coma or low delirium, with an increased propensity to gangrene and a resolved state of the blood, (symptoms characteristic of this last stage) recourse is commonly had to the peruvian bark, serpentaria, contrayerva, aromatics, volatile alkali, musk, mineral acids, and wine, with the application of blisters to the extremities.—The peruvian bark is strongly recommended by Pringle and Huxham, at this period of the fever ; and, certainly, from the experience we have of the bark in gangrenes, and in all cases of debility, it is the medicine that promises to be of the greatest advantage. The only objection that at this time can be made to its use, supposing the stomach capable

capable of retaining it, is, that if given in small quantity, it is opposing a trifling remedy to a violent disease, if in larger doses, it is apt to increase the dryness of the mouth and difficulty of swallowing, and often to such a degree as to prevent our continuing the use of the remedy. It is from this consideration that, wherever the bark is necessary, I never trust to the quantity given by the mouth, but also order it to be thrown up by glyster every twelve hours; and, to support the strength, I commonly direct the bark to be boiled in mutton or chicken broth: of this, half a pint or twelve ounces may be administered at a time, to which it is generally adviseable to add twenty or thirty drops of the *tinctura opii*. I do not suppose that the bark, thrown up by glyster, would answer equally well as when taken by the mouth, in preventing the paroxysm of an intermittent, or the accession of a remittent fever; but,

in the last stage of putrid or malignant fevers, where the dryness of the mouth and fauces, and the difficulty of swallowing, frequently prevent the sick from taking bark, in the quantity necessary to produce any permanent effect, glysters of it are frequently of the greatest service, particularly when given in the manner now described, as they answer the double purpose of medicine and of nourishment. But the use of the bark has not been wholly confined to the last stage of this fever; it has been often given in the very beginning, and there are many physicians who look upon it as the principal medicine to be employed in this, and in every fever of the putrid class, and at every stage of the disease.

It has been a common error in the practice of physic, whenever any medicine was found of extensive utility, to suppose it universally so; it saves the trouble of discriminating, supercedes the necessity of experience,

experience, and puts knowledge and ignorance on a level. Tar water, lime water, James's powder, peruvian bark, have each in their turn, within this last century, been considered as panaceas, or medicines of universal application, and equal to the cure of all diseases ; but the folly of the day, or the caprice of individuals is of short duration, and medicines, like men, at last take their level, and come to be estimated according to their real value.

Bark is, without doubt, a medicine of very extensive utility, and yet the indiscriminate use of it is attended not only with inconvenience, but with danger ; in many cases of erysipelas, in the first stage of the scarlatina anginosa or ulcerated sore throat, and in the beginning of contagious fevers, I have seen the bark given, and have myself repeatedly given it, both in small and in large doses ; the first had little sensible effect, the latter evidently aggravated all the symptoms ; the heat of

the body, thirst, dryness of the skin mouth and fauces, quickness of the pulse, restlessness, anxiety, and watchfulness constantly increasing, and in proportion to the quantity of bark given. I have likewise seen all those symptoms subside upon leaving off the bark, and adopting a different mode of cure. To conclude ; after an experience of six and twenty years, I am not more convinced of opium relieving pain, or of mercury being a remedy for the venereal virus, than of the impropriety and bad effect of giving bark in the beginning, or in the early stages, of the diseases above mentioned. I am also fully persuaded, that in the latter periods of those diseases, when bark is not only useful but necessary, it is of great advantage to give it in the form of glyster, and in the manner already described; a smaller quantity is then required to be taken into the stomach, consequently there is a greater chance of its being retained, and of avoiding the dryness of the mouth and fauces.

As

With respect to the serpentaria and contrayerva roots, which of late years have been so frequently employed in contagious fevers, as I have generally given them, or seen them given, with the bark, I have not been able to ascertain whether, of themselves, they have any sensible effect. They are aromatic bitters and tonics, and as such may be useful ; but as they are in general nauseous to the patient, and, when joined with the bark, render its taste more disagreeable, I have of late years entirely laid them aside.

Volatile alkali, and musk, may possibly be of service to abate symptoms, but I do not suppose, and indeed have never observed, that they have any permanent effect in fevers. The case is different with the mineral acids, the antiseptic power of which has been often noticed : when largely diluted, they are useful in the early stage of putrid fevers, by quenching thirst, and lessening the heat of the body ; but their most
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remarkable effect is, checking the tendency to extravasation and hemorrhage ; and, in the last stage of those fevers, joined with the bark, they seem to increase the power of that medicine, in resisting the disposition to gangrene.

As for wine, it has been universally recommended in contagious fevers, and, unless where the sick themselves have a dislike to it, which is sometimes the case, or when there is reason to apprehend a phrenitic delirium coming on, it may safely be allowed in every stage of the disease. The quality of the wine, and the quantity of water with which it is diluted, will depend upon the time and symptoms of the disease. In the last stage, when the patient is extremely weak, with a sunk pulse, and cold sweats, the strongest wine is required ; and the proper quantity can only be determined, by the effect it produces. I have given, with advantage, two bottles of madeira a day, for several days together,

together, and I once gave two bottles of port wine in twelve or fourteen hours, to a patient who recovered.

I have already mentioned, from Dr. Lind, the utility of blisters, in the first stage of contagious fevers, or in the lighter degrees of infection. ... I cannot say that, at a more advanced period of this disease, I have observed much advantage from their application; in the last stage, when they are commonly applied as stimuli to the legs and arms, I have never seen them of the smallest utility, and I think there is a considerable risk of their bringing on mortification. Where a stimulus of this kind is required, I prefer the application of sinapisms or mustard poultices, to the feet; but even those, if suffered to remain too long, sometimes occasion inflammation and painful ulceration of the part, which, in all such cases, we should carefully avoid.

Before I conclude this subject, it may be necessary to add a few words concerning the

the regimen and management of the sick, as their recovery is greatly promoted by proper attention to these circumstances.

I have said, that they should be kept in bed, and in a horizontal posture ; their beds ought to have no curtains, or at least the curtains should not be drawn about the bed, so as to prevent the free circulation of air ; the heat of the room should be temperate, rather cold than hot ; the windows, unless in very severe weather, kept open during the day ; the quantity of bed clothes must be regulated by the state of the patient, and his habits of life ; in general, the sick should be lightly covered. Liquid nourishment is, in general, the only food they require, and as they commonly dislike broths, we are confined to the use of gruels, panadas, and vegetable jellies, to which wine occasionally may be added ; but whatever they take should be given in small quantities, and often. Their drink should never be more than tepid, and, when
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there is no symptom of visceral or internal inflammation, quite cold. In many cases, I have no objection to ice, or to drink cooled in ice. They should not, however, drink much at a time ; and, as they have seldom great thirst, they do not require it. Fruit is commonly agreeable and useful to them.

Treatment of particular Symptoms.

DURING the course of most fevers, there are symptoms occur which greatly increase the sufferings and danger of the patient, and, as they require a specific or local treatment, demand a particular attention on the part of the physician. In the present fever, the symptoms that most immediately claim our notice are, great irritability of the stomach itself ; burning heat and oppression at the region of that viscus ; anxiety, lowness, palpitation, and tremors ; headach, and phrenitic delirium ; symptoms of inflammation affecting other parts of the body ; profuse sweating ; purging ; hemorrhages, and gangrene.

The

The stomach, which is always more or less affected in contagious fevers, is often, in the beginning so extremely irritable as to reject every thing taken into it. This is always a troublesome and very alarming symptom, as it commonly, I believe, arises from inflammation of the peritoneal or villous coats of the stomach itself, or of some of the neighbouring viscera. In this distressing case, I have known some relief afforded by fomentations, or by a plaster of theriaca, or of opium and camphire, applied to the præcordia; internally, absorbents, mucilages, and opium, are the chief remedies. But, the medicine which I have found the most useful is calomel, given in pills, to the quantity of one, two, or three grains, with opium, and repeated at intervals until it procured some evacuation by stool.

For allaying the burning heat and oppression at the præcordia, I know nothing so serviceable as twenty or thirty drops of vitriolic æther in a glass of Seltzer water,
neutral-

neutralized with a tea spoonful of lemon juice, and taken in the state of effervescence. The vitriolic æther, or spiritus ætheris vitriolici, is also the best cordial and most effectual remedy, for the lowness, anxiety, tremors, and catchings, which so frequently occur.

The most effectual means of obviating the phrenitic delirium, a symptom so much to be apprehended, and which in general proves so fatal, is to keep the body open, the air of the room cool, the patient lightly covered, and to avoid bark and all heating cordials. When the delirium had come on, I never observed any sensible relief from the application of leeches, or of blisters; but I have repeatedly seen a patient greatly composed by cold embrocations constantly applied to the forehead, or to the head shaved, and also by fomenting the legs with warm fomentations. The embrocation I commonly used is rose water, with a small proportion of vinegar, and of camphorated spirit of wine.

Symptoms

Symptoms of pneumonic inflammation are only, I imagine, to be remedied by fomentations, cupping, or blistering, but, as I have seldom met with such symptoms, I can say little on the subject, from my own experience. Where there is a tendency to profuse sweating, the patient should sleep on a mattraß, be kept extremely cool, and take frequently a cup of the infusum rosæ. Antimonials, in this case, I have already said were improper; if the mouth and fauces are not dry, the bark may be given; at any rate, it should be administered by glysters. The drink should be red wine and water, cold, with a few drops of the elixir of vitriol.

Too great a tendency to purging requires also a particular attention; absorbents, mucilages, and opiates, with ipecacuanha or rhubarb in small doses, are the proper medicines to remedy it; antimonials, and acids, whether vegetable or mineral, must be avoided.

Of

Of the convalescent State, and of the general Effect of contagious Fevers on the Constitution.

CONTAGIOUS fevers, especially when they arise from a jail contagion, seldom terminate in complete recovery, and it is commonly a long time before those who have escaped the first and more immediate danger, are restored to their former health and strength; they in general remain languid, their appetite impaired, and their sleep unrefreshing; they are giddy and faint, upon attempting to walk, or even from an erect posture; their pulse continues extremely quick, sometimes even quicker than during the fever; their sight is frequently impaired, and the pupils of the eyes greatly dilated, with a puffy redness of the eye-lids, particularly in the morning; their legs are apt to swell towards night; and they have

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generally

generally a preternatural heat and dryness in the palms of their hands ; sometimes they become suddenly dropical or anasarcaous, and I have known instances where, with the symptoms of water in the chest, or pericardium, they have died suddenly. I have repeatedly seen persons afflicted in all the different ways I have now described, and which it is necessary for the physician to know that he may be prepared to obviate them ; for, if neglected, they will in the end prove equally fatal with the fever itself.

From the state of weakness and irritability described above, people usually recover by pursuing the methods I formerly pointed out ; it may be proper however to observe, that as the head is more particularly affected in these fevers, it is sometimes very long before the patient is perfectly free from giddiness, and partial defects of sight : I have sometimes seen the pupils of the eyes remain for several weeks so considerably dilated,

dilated, with a pulse from a hundred to a hundred and twenty, as to give just grounds to suspect that the brain was materially injured; and yet these symptoms at last have gradually disappeared, and the complete recovery of the patient proved, that they were only the effect of temporary weakness and irritability.

When convalescents become suddenly anasarcaous, they require purging, and commonly receive immediate relief from a brisk purge, combined with squills, or some other diuretic medicine. Cream of tartar with jalap is, perhaps, one of the best purges we can employ in such a case.

When there is reason to apprehend water in the chest, or pericardium, it is necessary to adopt a plan of treatment proper for the cure of this complaint. I need hardly remark, that there would be great impropriety and danger in using fox-glove, in a case where the action of the heart is already so considerably weakened.

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Besides

Besides the complaints which I have now enumerated, others might be mentioned, as being sometimes brought on by contagious fevers, such as epileptic fits, asthma, diseased liver, jaundice, &c. but as they occur more rarely, and as I have nothing new to offer respecting their treatment, I shall conclude the present subject with the declaration of Sydenham.—

*“ Sicubi circa theoriam me hallucinatum fuisse
 “ lector deprehendat, errori veniam peto;
 “ verum quod ad praxim attinet, profiteor me
 “ omnia ex vero tradidisse, nihilque uspiam
 “ proposuisse nisi quod probe exploratum
 “ habeo.”*

APPENDIX,

CONTAINING

1. A Paper on the Efficacy of the Spiritus Vitrioli dulcis, in the Cure of Fevers, first published in the Medical Communications in the Year 1784; with Remarks.
2. An Examination of the different Means that have been hitherto employed to destroy the Jail Contagion, with the superior Advantages of the nitrous Acid for that Purpose.
3. Letters from the Commissioners of sick and wounded Seamen to the Author, respecting the Jail Distemper at Winchester.
4. Report of the Committee of the House of Commons, upon the same subject.
5. Memorial presented to the Honourable Lord North, &c. &c. &c.
6. Formulæ Medicamentorum, in usum Nosocomii Winchesterensis, conscriptæ.

APPENDIX.

*On the Efficacy of the Spiritus Vitrioli
dulcis, in the Cure of Fevers. By
JAMES CARMICHAEL SMYTH, M.D.
&c. &c. Read April 8, 1783, and
published in the first Volume of the Medical
Communications of London.*

“ WE may observe (says a late eminent
“ writer) * that in fevers in different coun-
“ tries and different ages, besides those re-
“ medies which have a manifest action,
“ physicians have used others, which,
“ though operating imperceptibly, were

* Sir John Pringle, in his Observations on the Diseases of the Army.

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“ imagined

“ imagined to be of some efficacy towards
“ conquering the disease.”

A very little professional experience, will convince any one of the truth of the preceding observation ; and a further acquaintance with the subject will as certainly lead him to regret, that whilst the remedies of the second description, which either theory or fashion have introduced, are many and various ; the number of the first are extremely limited.

The peruvian bark, the different preparations of antimony, and some of the neutral salts, comprehend, I believe, all the medicines whose efficacy, independent of evacuations, are universally admitted in the cure of fevers. Whether or not the dulcified spirit of vitriol deserves to be added to them, I shall leave others to determine ; and confining myself for the present, to the mere duty of an historian, briefly relate a few facts respecting the use of this medicine, which possibly may
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be thought not altogether unworthy of public notice.

The vitriolic acid has been long known as a useful remedy, and stands highly recommended by Riverius and Sydenham, for allaying febrile heat and thirst, abating inflammation, resisting putrefaction and checking hemorrhage; and Sydenham informs us, that he chiefly depended upon this medicine for moderating the eruptive fever in the confluent small-pox.

The spiritus vitrioli dulcis, a composition principally of the volatile vitriolic acid and alcohol *, differs very materially from

* The various productions obtained from the combination of the vitriolic acid and alcohol, are at present better understood, and more accurately distinguished, than formerly. The spiritus vitrioli dulcis, now the spiritus ætheris vitriolici of the London College, is known to be only the vitriolic æther with alcohol, and in the proportion nearly of one to two: the Edinburgh College, indeed, have ordered it to be made of æther and alcohol, exactly in that proportion. The College

from the fore-mentioned medicine, and when prepared in the manner directed by the London College, shews little or no acidity to the taste ; but has a peculiar pungency, and agreeable flavour, resembling the vitriolic æther, or æther of Frobenius, a small quantity of which is commonly mixed with it.

College of London, in their late Pharmacopœia, have ordered æther to be procured from the spiritus ætheris vitriolici, adding a small quantity of the aqua kali, to neutralize or detain any portion of the volatile vitriolic acid which may have come over in the former distillation, and which, perhaps, it is impossible entirely to avoid. The spiritus ætheris vitriolici compositus, or the liquor anodynus mineralis of Hoffman, is the spiritus ætheris vitriolici, with a small addition of (what is called) oleum vini, another production of the same process.

Æther, when combined with alcohol, becomes miscible in water, and, upon that account, is in a more convenient form for being exhibited as a medicine. As there are cases, however, where we may prefer giving the æther by itself, when we do so, it is a necessary precaution to pour the æther first on sugar, before we add the water, which, to a certain degree, prevents its sudden evaporation,

This

This medicine, though long kept in the shops, has very seldom, I believe, been employed in practice; a preparation extremely analagous to it, well known by the pompous title of *liquor anodynus mineralis Hoffmanni* being commonly preferred as an antispasmodic; but neither one nor the other (so far as I have been able to learn) had in this country, ever been used in the cure of fevers, previous to the year 1769; unless the dulcified spirit of vitriol may be said to have been so, as forming part of the composition of a quack medicine sold in town by the name of Clutton's febrifuge tincture*.

It was in the summer of the year 1768, that I began to make trial of the dulcified spirit of vitriol in the cure of fevers. From reflecting on the sensible qualities

* This medicine had long been laid aside, and was little known, when it was again introduced to public notice by Mr. Sutton, who used it in the composition of a drink he gave to his patients under inoculation, which he called his *punch*,

and

and composition of this medicine, I was led to imagine, that I should find it useful as a cordial and antiseptic, in cases of the putrid and malignant kind. A little experience convinced me that my conjecture was well founded, and that the medicine was possessed of powers even beyond what I had at first suspected; but having at that time few opportunities of making such experiments as would prove satisfactory, I applied to a friend, physician to one of the royal hospitals, of whom (after explaining to him my opinion of the efficacy of the medicine) I requested the favour that he would give it *alone*, in the first cases of fever * which should occur at the hospital, and by so doing enable us to judge fairly of its real effects.

* An account of those cases was read in the year 1769, at the Medical Society of London, (the Editors of the medical observations and enquiries) but, for private reasons, which it is needless here to explain, it was not published by them, nor until the year 1784.

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The five following cases then, being the first in which it was thus administered, I shall give as they stand in my journal ; and having myself minuted down the particulars of each, and taken the reports daily at the bed-side of the sick, I can answer for the truth and accuracy with which they are related.

C A S E I.

Ann Parker, a young woman about twenty years of age, who had been seized with a fever eight days before, was admitted into the hospital on the 25th of October 1768, with the following symptoms, viz. great weakness, lowness and anxiety ; oppression at the præcordia, with frequent sighing, and constant drowsiness, being always asleep, unless roused by speaking or calling to her ; her tongue was white and moist ; her neck and breast covered with many small petechiæ of a dark brown colour ;
the

the heat of her body considerably increased, and her pulse about 120 in a minute.

About five o'clock in the afternoon of the same day, she began to take the dulcified spirit of vitriol in the following form :

R. Spirit. vitriol. dulcis drachmas tres
 Aq. puræ - - - libras duas
 Sacch. albi - - - uncias duas
 Misce capt. uncias duas secunda quaque hora.

October 26th—Pulse 108. She sweated after taking the medicine; rested well in the night, and has less of the oppression and anxiety.

27th—Pulse 94. The medicine agrees with her, and continues to occasion a moisture on her skin; she is still drowsy and dozing, but when roused is perfectly sensible. Having had no stool since her admission into the hospital, she was ordered to take the following bolus at bed-time :

R. pulv. rhabarb - - - scrupulum unum
 Sal. nitri - - - grana decem
 Syrup. simpl. q. s. fiat bol.

28th

28th—Pulse 88. The bolus purged her three times; she continues to have a moisture on the skin; rested well in the night; is always asleep even during the day, and has no complaint but weakness.

29th—Pulse 86. Her skin cool and temperate; and excepting a constant drowsiness, is free from complaints.

30th—Pulse 72. The lowness and drowsiness continue; in other respects she is well. She was ordered beef-tea.

31st—Pulse 62. Her skin is temperate; she is still low and languid; her urine does not break nor deposit a sediment.

Nov. 1st.—Pulse 65. She rested well in the night; as she now begins to loath the medicine, it is discontinued, but not having recovered her appetite and strength, she was directed to take a decoction of bark, and a few days after was dismissed cured.

C A S E II.

William Winbrough, a young man about nineteen years of age, who had been seized with a fever a week before, was brought to the hospital October 25, 1768. At the time of his admission his skin was extremely hot; his pulse 100 in a minute; he complained greatly of headache, anxiety, debility and dejection. When he endeavoured to put out his hands, or to show his tongue, they were affected with a remarkable tremor. His tongue was white and moist; his countenance flushed, and the white of his eyes had a turbid appearance. There were florid petechiæ on his neck and breast, with a red rash all over his breast and arms. He was ordered the dulcified spirit of vitriol, in the same manner as in the preceding case.

October

October 26th—Pulse 80. He sweated after taking the medicine ; has passed a good night, and says that he is perfectly easy. Having had no stool, he was ordered a common glyster.

27th.—Pulse 78. Complains of nothing but weakness. The moisture continues on his skin ; his tongue is still moist and white ; the glyster having failed in procuring an evacuation, he was ordered to take at bedtime a rhubarb bolus.

28th—Pulse 66. The bolus has operated four or five times ; he continues to sweat gently ; the medicine agrees with him, and he is so much relieved by it that (to use his own expression) he thinks it has saved his life.

29th—Pulse 68, full and strong. The tremor of his hands still continues, though in a less degree, and his countenance has a dull and heavy appearance.

30th and 31st—Pulse 68. His urine now breaks and deposits a sediment ; he is free

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from

from complaint, and begins to have an appetite for food.

Nov. 1st—Pulse 56. The tremor, petechiæ and rash are now entirely gone; his countenance is more lively; the *spirit. vitriol. dulcis* was now laid aside, and he was ordered to take a decoction of bark and snakeroot.

Nov. 2d—Pulse 52. His urine deposits a lateritious sediment; he still complains of weakness and giddiness, but expresses a desire for meat.

3d and 4th—Grows daily stronger, and has, in a great measure, recovered an healthy appearance. A few days afterwards was dismissed the hospital.

C A S E III.

Sarah Ford, a woman about fifty years of age, was admitted into the hospital on the first of November, 1768. She was of a delicate and weakly constitution, and had
for

for many years been subject to hysterical complaints. About a fortnight before, she had been seized with a shivering, succeeded by heat, headach, pain of her back, violent vomiting and purging. The vomiting had soon ceased, but the purging, though not so violent as at first, at the time of her admission continued, together with headach and pain of the back, anxiety, weakness, lowness and great thirst. Her pulse was 120 in a minute.

The *spirit. vitriol. dulcis* was ordered in the same manner as in the two former cases, only with this difference, that instead of three drachms there was half an ounce put to each quart of water. She was directed likewise to use the *decoct. album* for common drink.

Nov. 2d—Pulse 92. She has only taken the medicine three times, and has always sweated after taking it. Her headach still continues, but the anxiety and pain of her back are greatly relieved.

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Nov.

Nov. 3d—Pulse 72. She slept but little in the night; the purging has entirely ceased; her skin feels temperate, and she has no complaint but giddiness and weakness.

4th—Continues free from fever, but is still weak.

5th—Having no complaint but weakness, is directed to take a decoction of bark, and in a few days was dismissed, cured.

C A S E IV.

Ann Bird, a young woman nineteen years of age, was admitted on the 1st of November, 1768. About six days ago, she was seized with a fever and sore throat, attended with headach and vomiting. The *velum pendulum palati*, uvula, and tonsils were swelled and greatly inflamed. The inflammation was of a crimson colour, with whitish sloughs on the tonsils and uvula.

She

She had great pain in swallowing, and even in speaking; and sometimes a degree of difficulty in breathing. There was a red efflorescence on her face and arms. Her pulse was 120 in a minute. All her symptoms were greatly aggravated towards evening.

She was ordered the *spirit. vitriol. dulcis*, in the same manner as in the two first cases, and also a gargle for her throat.

Nov. 2d.—She has sweated constantly, though not profusely, since she began to take the medicine; has had a tolerable night, being neither so hot, nor having so much difficulty of breathing as before. Has bled at the nose in the night, and again this morning. The inflammation and swelling of the fauces are much abated, but the white sloughs remain on the uvula and tonsils; and the red efflorescence is still to be observed on one arm. She can swallow with greater ease, and speaks more

distinctly. Her pulse is 78 and full, and she complains much of giddiness.

Nov. 3.—Her pulse is now 80; her skin cool; her throat greatly better; has this morning again lost a considerable quantity of blood by the nose, and was also sick at the stomach. Upon enquiry I learned that her menses were obstructed, and that the present time was the usual period of their appearance.

4th—Her pulse is 75, and her skin temperate. The redness which was upon her face and arms is entirely gone off; and there is now only a slight inflammation of a pale colour, on the uvula and tonsils.

5th—She is now free from fever, and the inflammation of the fauces is almost entirely gone. She was ordered the bark as in the preceding cases, and in a few days was dismissed the hospital, perfectly cured.

CASE

C A S E V.

Elizabeth Ruffel, forty years of age, about the 27th of October, 1768, was seized with the usual febrile symptoms, accompanied with a sore throat, sickness, vomiting and purging. The vomiting was of short duration; the purging continued for a day or two longer, but on the 2d of November, when she was admitted into the hospital, had entirely ceased. Her complaints were now a soreness and stiffness of her neck, violent headach, and pains in her limbs. Her arms and hands appeared swelled, and there was a red efflorescence on her arms. The inflammation of the fauces was confined in a great measure to the *velum pendulum palati* uvula, and *amygdalæ*, which were of a deep red colour; her pulse was 130 in a minute.

L 4

She

She was ordered the *spirit. vitriol. dulcis*, as in the three preceding cases.

Nov. 3.—Her pulse is still 130; she has sweated a little in the night; finds herself no better, and thinks that her headach is rather worse since taking the medicine.

4th.—Pulse 140.—She does not sweat after taking the medicine; complains principally of pains in her limbs, and imagines that she has, in some measure, lost the use of her lower extremities. Her throat is not so much inflamed, and the inflammation is of a paler colour. Being costive in her body she was ordered a glyster, and a solution of cream of tartar in water for her common drink. The dose of the *spirit. vitrioli dulcis* was also encreased in the following manner:

R. Spirit. vitrioli dulcis	- -	drachmam unam
Aq. puræ	- - -	uncias quatuor
Syrup simp.	- - -	drachmas duas
M. F. Haustus tertiis horis sumendus.		

Nov.

Nov. 5th.—Pulse still 130 —She has got out of bed this morning and looks tolerably well. Her tongue is clean; the inflammation of her throat is greatly diminished, and she has now no anxiety. The redness remains on her arms although her skin feels temperate. She complains much of pain and weakness in her limbs; says that the medicine occasions no sweating, though it heats her much. She has had some loose stools since she used the cream of tartar drink.

She was ordered to lose twelve ounces of blood, and to take the *spirit. vitrioli dulcis*, in the quantity and form first prescribed.

6th.—The headach and pains of her limbs continue; the heat of her body is temperate; the efflorescence on her arms entirely gone, and there is only a slight redness remaining on the uvula and tonsils. Her pulse is still 130 in a minute, and intermits after every sixth or eighth pulsation.

She

She says that the medicine, even in the present form, makes her hot and thirsty; and as it appeared to have no effect in relieving her pains, it was discontinued, and a volatile julep was substituted in its stead, which agreed well with her, and she soon recovered.

The *spirit. vitrioli dulcis* was administered in two other cases of fever besides the foregoing; in one of which it succeeded, but failed in the other; of these I can give no particular account, some private business having interrupted my attendance at the hospital. I was, however, informed, that in the case in which it was unsuccessful, though the dose had been increased to a drachm, and continued for four or five days, it never occasioned any permanent diaphoresis, nor lessened the frequency of the pulse; but in that in which it succeeded, it produced a diaphoresis, and operated much in the same manner as in the four first cases.

The

The following table shews, at one view, the daily alterations in the frequency of the pulse.

Day.	Case 1.	Case 2.	Case 3.	Case 4.	Case 5.
1	Pul. 120	Pul. 100	Pul. 120	Pul. 120	Pul. 130
2	— 108	— 80	— 92	— 81	— 130
3	— 94	— 78	— 72	— 80	— 140
4	— 88	— 66	—	— 75	— 130
5	— 86	— 68	—	—	— 130
6	— 72	— 68	—	—	—
7	— 62	— 68	—	—	—
8	— 65	— 56	—	—	—

Whoever considers with attention, the preceding cases, and is acquainted with the usual progress of fevers, accompanied by symptoms similar to those described, will readily allow, that these examples, though not very numerous, are sufficient evidence of the efficacy of the medicine in question; and that its power in removing the anxiety and reducing the frequency of the pulse, was too remarkable to escape the notice even of the most careless of the profession. But although the foregoing cases may

may be thought fully to prove the efficacy of the medicine, it will, perhaps, be expected, that after fifteen years experience I should give some more recent instances of its success, or some further observations respecting its use. Of its success, it would be an easy matter for me to give more examples, and to add to them some respectable testimonies from others, but the society will probably be of opinion, that it is better to avoid the tediousness of medical cases and to give the result, rather than the detail of my experience on this subject.

In the first place, I think it necessary to observe, that any physician who shall give the dulcified spirit of vitriol indiscriminately in fevers, and expect to meet with the same success which followed these first trials of it, will, in all probability, be disappointed; as the medicine, though of undoubted efficacy in certain cases, is by no means of general application.

In

In the acute rheumatism, and in the various forms of the inflammatory fever, it is extremely improper; even in the case of Elizabeth Ruffel, which appeared to me at the time a kind of *arthritis vaga* (or what is vulgarly called rheumatic gout) it evidently aggravated the complaint.

In hectic and pulmonic cases, the advantage derived from it is trifling or doubtful.

In the remittent and common putrid fevers, I have sometimes also prescribed it without any apparent benefit; it is, however, but justice to acknowledge, that in such cases, I have never yet observed any bad consequence to follow from its use; and that even where it failed of success when given alone, it has been productive of the best effects, when joined with small doses of emetic tartar.

I may likewise with truth affirm, that in the low state of putrid fevers, (where cordials are wanted) it is one of the best medicines

dicines of the kind, and I think greatly assists the bark in resisting the septic tendency of the disease. But the cases of all others, to which it seems to me the most peculiarly adapted, and where I have seen it produce the most sudden and surprising effects, are those fevers occasioned by contagion, or what are commonly called the jail or hospital * fevers. In these, as its cordial powers are more immediately necessary, so they are in general more evident and striking; its operation also as a diaphoretic, is here of the utmost consequence: for by promoting a perspiration or sweat, it promotes the only method in my opinion, by which these fevers (unless at the very beginning) can possibly be cured. Upon the whole, I esteem the dulcified spirit of vitriol a medicine of great utility in the cure of putrid fevers in

* For a description of these fevers *vide* Sir John Pringle on the Jail Fever; and Dr. Lind's Essays on Fevers and Infection.

general,

general, and more particularly so in those arising from contagion; nor do I know (excepting perhaps emetic tartar, or some similar antimonial) any one medicine to be preferred to it; not even the peruvian bark itself, though so strongly recommended by Sir John Pringle *, an authority in physic to which I shall always pay the highest deference and respect.

* It is a circumstance perhaps deserving our notice, that in the cure of the jail fever, Sir John Pringle never gave the bark till the third or last stage of the disease; a period when I apprehend the cure to be very much out of the reach of art, and when all the advantage to be derived from any medicine is merely the palliating or obviating of symptoms. Neither would the success attending his practice induce us to follow his example, as he acknowledges, with his usual candour, that at Ipswich he lost at least one fifth of his patients.

REMARKS.

R E M A R K S .

AS it is now twelve years since the preceding paper was published, and near six and twenty years since these first trials were made, I certainly have had time enough to judge of the effects of this medicine, and of the cases in which it is proper to be given, and have no hesitation in declaring, that the result of my experience is only a confirmation of what I have already published on the subject. The spiritus ætheris vitriolici, or vitriolic æther, which is nearly one and the same thing, I have generally found a medicine of great service in contagious, petechial, and low nervous fevers * : although I have
always

* As our distinctions of fevers are by no means accurate, nor is it possible they ever can be so, (if, as I have alledged, they are only varieties of the same disease,

always observed the most remarkable effects from it in the first. Its sensible and more immediate operation, in this fever, is to relieve the lowness, anxiety, tremors, &c.

to

disease, and varieties that run into each other) it becomes necessary to define the terms we employ. By *contagious fever*, then, I would be understood to mean, not a fever that is capable of being communicated, because most fevers are so more or less, but a fever caused by the contagion of the human miasmata, or by a very highly putrid vapour.

Petechial fever, is a term also very ill defined ; for, as petechiæ frequently occur in all putrid fevers, it may be said, that they cannot distinguish any particular species, nor constitute a specific difference. This I readily admit ; but it is sufficient to my purpose, as a practical physician, that petechiæ appear at some seasons, and in some fevers, more frequently and more constantly than in others ; neither do they depend upon the violence of the disease, nor, apparently, upon the violence of the cause ; nor do they appear to have any certain relation with the general tendency to putrefaction ; but from whatever circumstance of the disease, or of the constitution they arise, I have remarked that the *spiritus ætheris vitriolici*, given with the infusion of roses, has, in this case, an excellent effect.

M

Lxxv

to lessen the irritability of the stomach, the irregularity and frequency of the pulse, and to cause a moisture or perspiration on the skin; in short, I have never yet seen any medicine given, whose efficacy is so sensibly felt by the sick themselves, or which seems to bring the disease to so speedy and happy a termination: but, as my testimony, or the communications of friends, may be suspected of partiality, I shall adduce an evidence on the subject, to which no such objection can be made.

An essay on the malignant pestilential fever, which lately appeared in the West-Indies has within these few days fallen into

Low nervous fever, is a term equally undefined with the former. I only mean to express by it those cases of fever where lowness and weakness is a principal symptom; not however when the weakness is directly and immediately caused by the fever, but when it is natural to the constitution, or is the effect of previous debilitating causes, operating either on the body or mind; or, is the consequence of fever continuing beyond the usual period of acute diseases.

my

my hands, in which I find the following observations * :

“ Æther was the only medicine that
 “ was in any degree truly and permanently
 “ beneficial, in enabling the stomach to
 “ receive and retain the peruvian bark.
 “ Many cases fully evinced this; and a
 “ few occurred in my practice, wherein *the*
 “ *cure was completed by this medicine alone.*”

This gentleman's evidence I consider as the more important, being the testimony of a man of observation, and whose book is written expressly for the purpose of recommending another practice, and another remedy. Again,

“ The only writer † I have met with,
 “ who recommends the use of æther in

* Vide Chisholm on the Malignant Pestilential Fever, introduced into the West-Indian islands from Boulam, &c. p. 192.

† It would appear that Dr. Chisholm had never read the Medical Communications of London, or did not imagine that æther and the spiritus ætheris vitriolici were in fact the same medicine.

" malignant pëtilential fevers, is M. Poiss-
 " sonnier : " C'est dans ce cas-ci surtout
 " qu'on peut proposer avec confiance quelques
 " petites doses d'éther vitriolique sur du sucre,
 " afin de combattre plus efficacement la
 " pourriture, et de rétablir le ton de l'estomac,
 " et de toutes les parties. Ce remède ranime,
 " sans être incendiaire, et semble devoir rem-
 " plir ici la double indication de soutenir les
 " forces de la nature, et de s'opposer à la
 " putréfaction des humeurs. Je sais qu'à
 " la Cayenne, où une maladie, à peu-près de
 " cette nature, a enlevé les quatre cinquièmes
 " des personnes qui étoient passées dans cette
 " colonie, plusieurs malades réduits à l'ex-
 " trême, ont dû leur guérison à l'usage qu'ils
 " ont fait de ce remède, et qu'ils prenoient
 " même en assez grande quantité *." This
 " ample testimony (continues Dr. Chif-
 " holm) was sufficient encouragement to

" * *Maladies des gens de mer.* tom. I. p. 351. See
 " also something nearly to the same purpose in " *Ob-
 " servations sur les Maladies des Negres, par M.
 " Darille.*" p. 49.

“ try it in a malady that had hitherto re-
 “ fisted all the means usually recurred to.
 “ The event justified the practice. I
 “ gave the æther in the following manner.
 “ The patient being allowed to remain
 “ undisturbed about an hour, I gave him
 “ about a tea-spoonful, in about half a
 “ wine-glassful of cool water. After this
 “ he continued undisturbed about two
 “ hours, when the dose was repeated. At
 “ the expiration of another hour, the bark
 “ was offered him ; and, if he swallowed
 “ and retained it, the æther afterwards was
 “ given only once in five or six hours.
 “ But as this very seldom happened, it
 “ was generally necessary to repeat the
 “ æther in the same quantity every three
 “ hours, till the spasm of the stomach was
 “ entirely overcome. Æther, given in the
 “ manner I have mentioned, is extremely
 “ grateful to the patient ; it occasions an
 “ agreeable warmth along the œsophagus,
 “ and gently stimulates the stomach. This

“ effect, however, does not continue long ;
 “ but the frequent production of it at
 “ length gives it permanency. It appears
 “ to act as a tonic, an antiseptic, and an
 “ agreeable stimulant ; a warm glow over-
 “ spreads the surface, and thirst, nausea, and
 “ oppression often have fled before it.”

Whoever compares the preceding observations of Dr. Chisholm and of Mons. Poissonnier with what I have written on the same subject, must be struck with the exact similarity between them. In respect to this I shall only say, that though one man may be mistaken in his observations, from seeing the effects of remedies in too strong a point of view, or, from having his judgment misled by prejudice, or by vanity ; yet, when different men, in different countries, and at different times, without having any communication with each other, agree in observing the same fact, there can be little doubt of the truth of their observation. The only merit I can claim, if it can be reckoned

reckoned such, is the having been the first to point out the efficacy of this medicine in contagious fevers ; and I am still the only one who has attended to its effect, in reducing the frequency of the pulse.

An Examination of the different Means hitherto employed to destroy the Jail Contagion, with the superior Advantages of the nitrous Acid for that Purpose.

THE various means hitherto employed for destroying contagion, may be arranged under two distinct heads, or classes, viz. the Physical, and the Chemical.

I formerly took notice that contagions, whether specific or putrid, are either checked, or completely destroyed, by the extremes of heat and cold ; and that they are also, by a free exposure to air and water, so diluted or dissolved, as to lose their noxious quality. Heat and cold then, with air and water, may be looked upon as physical agents, which, under certain circumstances, are effectual in blunting or destroying contagion. A degree of heat, nearly that of an oven, is found

found necessary for the complete destruction of contagion, but as this degree of heat is incompatible with animal life *, its application is solely confined to the purifying of such clothes, furniture, &c. as cannot be injured by this treatment. But, although the degree of heat requisite for the complete destruction of contagion can only be used for one particular purpose, heat and fire, judiciously managed, may, in various ways, tend to lessen the power, or to check the progress, of this pernicious vapour: for, as closeness and dampness are favourable to the production and spreading of contagion, drying and rarifying the air, by counteracting these, must, so far at least, be proper antidotes. But, independent of

* A great heat like that of an oven, such as would prove destructive to all animal life, effectually destroys this infection in all substances which can be for some time exposed to it. Vide Lind's Observations on the Jail Distemper, Ann. 1779.

those

those effects of heat, an open fire, especially where the fuel is burnt in a narrow flue, is of great benefit ; for, by consuming a portion of the air, it causes a more sensible renewal of it, and, in fact, is one of the best ventilators. In employing fire and heat, however, care must be taken not to increase the heat in the apartments of the sick, as this would prove more hurtful to them, than the drying or renewing of the air could be advantageous.

The degree of cold necessary to destroy contagion is probably, like the degree of heat, inconsistent with life ; and, therefore, although we hear of contagion having been checked or suppressed by cold, there are few instances, if any, of its being completely destroyed. Besides, as it is not in our power to employ cold at pleasure, the question respecting its effect, of whatever importance it may be to the pathologist, is of little consequence to the practical physician.

That

That noxious vapours are hurtful only when concentrated, and are harmless when diffused, are facts or data universally admitted ; and it is upon this principle, that clothes, bedding, or other matters to which contagion adheres, are purified, or lose their deleterious quality, by exposure for a sufficient length of time to the open air, or to a current of water ; but, as the time requisite for this mode of purification is uncertain, and as contagious clothes, goods, &c. cannot always be exposed in a proper manner *, we are commonly under the necessity of having recourse to those more expeditious means of purification which chemistry affords, and which I shall next examine.

* Dr. Lind has very justly remarked, that no ventilation or admission of air into prisons or hospitals, can remove or destroy contagion when once it is present. The same may be said of water. But though neither one nor the other under those circumstances can destroy contagion, both may be usefully employed in blunting its force, and in preventing the spreading of the disease.

The

The chemical means hitherto employed for destroying contagion, are the following :

Burning sulphur with charcoal.

——— with arsenic.

nitre.

gunpowder.

portfire.

tar.

tobacco.

wood.

Boiling vinegar.

——— with camphire,

tar.

Washing with vinegar.

White-washing.

Painting.

The vapour produced by the burning of sulphur, is known to be the volatile vitriolic or sulphureous acid, one of the most powerful of the mineral kingdom, and the effect of it in destroying contagion has been long

long established; but as it affects, even in small quantity, the respiration of animals, inducing suffocation and death, it can only be employed for fumigating clothes, furniture, or empty apartments. When burnt with charcoal, in the common way, we obtain not only the sulphureous acid, but also the carbonic, or fixed air, which, though it can have little influence on contagion, renders the common air less fit for respiration; a circumstance hardly deserving attention where the sulphur is burnt in a fumigating room, or a place set apart expressly for the purpose of fumigation, but which is of great importance when sulphur is burnt between the decks of ships, or in hospital or prison wards, where men are soon afterwards to be lodged. The occasional addition of arsenic seems to have been made by Dr. Lind, with a view of increasing the deleterious quality of the vapour; but it appears unnecessary, as the sulphureous acid is of itself sufficiently powerful for destroying contagion; besides,

besides, I doubt much, if the vapour of arsenic is not too heavy to rise with the acid of sulphur.

Burning or deflagrating nitre.—Having had some experience of the efficacy of the nitrous acid in destroying contagion, and being sensible of the disadvantage of fumigating hospital or prison wards by burning sulphur with charcoal, as was commonly practised, I resolved to employ nitre, instead of sulphur, at Winchester; never doubting that I should obtain, by deflagrating nitre, a portion of nitrous acid, as well as the nitrous air or oxygene; but a farther acquaintance with chemistry convinced me of my mistake, and that the deflagration of nitre never produced any nitrous acid. It is therefore evident, that deflagrating nitre in the prison and hospital wards at Winchester, could have no effect in destroying contagion, and no farther effect in purifying them, but so far as it furnished a quantity of oxygene, or air much purer than the common air of the atmosphere.

I observe

I observe, in Dr. Rush's publication on the yellow fever of Philadelphia, that the physicians of that city lately fell into the same mistake that I formerly did, *viz.* deflagrating or burning nitre as a means of destroying contagion.

Burning gunpowder.—If there is no nitrous acid obtained by burning or deflagrating pure nitre, we cannot expect to procure any from burning gunpowder *, either wet or dry †. The charcoal in the composition possibly yields a small quantity of carbonic acid, whilst the sulphur, uniting chiefly with the alkaline basis of the nitre, forms a hepar sulphuris, as the water used in washing a gun plainly shews.

* Gunpowder consists of seventy-five parts of pure nitre, fifteen and a half of charcoal, and nine and a half of sulphur.

† Next to the smoke of wood, for purifying a tainted air, I esteem that of gunpowder. This I often use, as being quite inoffensive to the lungs, &c. Vid. Lind on Fevers and Infections, p. 51.

Burning

Burning portfire *.—This composition of sulphur, nitre, and charcoal, has likewise been employed † for destroying contagion ; and as the sulphur in this is the predominant article, it will perhaps furnish some sulphureous acid, though I should apprehend not a sufficient quantity to be effectual in destroying contagion.

Burning tar ‡.—The use of tar seems natural enough to sailors, who may be supposed partial to what they are constantly accustomed ; but, if we examine the subject with attention, it is evident that the vapour arising from tar, whether burnt or boiled, must be a weak agent against contagion. The empyreumatic oil can be of no service but by opposing one disagreeable smell to another, whilst the ligneous acid, at best a

* Portfire is made of one half sulphur, one fourth nitre, and as much charcoal.

† Vid. Chisholm on the West India Fever.

‡ By smoaking this ship (Revenge) well with the vapour of tar, the infection had abated. Vid. Lind, p. 2.

weak

weak one compared with the mineral acids, is in great measure destroyed by burning, and is so diffused in the vapour of boiling tar, as to prevent entirely any effect which this acid, in a more concentrated state, might otherwise produce.

Burning tobacco.—There is an ancient prejudice respecting the antipestilential quality of tobacco, founded, I believe, on a tradition which is entirely void of truth, that the plague never entered a tobacco shop. Dr. Lind however seems to have had a high opinion of it*, but upon what this was founded I cannot pretend to say, as the smoke of tobacco, so far as I can perceive, has no advantage

* When prisoners can be removed, the infection will most effectually be extinguished by their removal to another prison, and, after thoroughly cleaning the infected one, to fumigate with the smoke of tobacco, &c. Vide Dr. Lind's *Health of Seamen*, p. 337.—Dr. Lind had so high an opinion of the power of tobacco, that he advised the buying up all the damaged tobacco, to be employed for this particular purpose.

N

over

over the smoak of any other vegetable matter.

Burning wood.—The smoke * of a wood fire was reckoned, by Dr. Lind, one of the most powerful means of destroying contagion, and he gives several examples where it was successfully employed. I might perhaps remark that some of these examples he had from persons who were not such accurate observers as himself; I shall not however call them in question, as I think the advantage supposed to be immediately derived from the smoak of wood, may fairly be ascribed to other causes. In the first place, the smoak of wood consists principally of soot, or of inflammable matter un-

* A judicious application of fire and smoak, is the true means appropriated for the destruction and utter extinction of the most malignant sources of disease. Again. It hath been experimentally found, that the smoak of a wood fire serves not only to lessen the force or violence of such poisons, but is also an excellent protection against their being conveyed. Vide Lind's papers on Fevers and Infection. Paper 1. p. 49.

consumed,

consumed, with some carbonic acid, neither of which can have any effect on contagion ; whilst the ligneous acid is in very small quantity, too small certainly to be of much service. But we know, that where there is smoak there is heat, and that where there is much smoak, in places where people are present, a free admission must be given to the air ; two circumstances which have considerable influence in weakening the virulence, and in preventing the spreading of contagion.

Boiling vinegar.—Vinegar * has, at all times, been considered as the grand antidote to contagion, though I believe it to be one of the most trifling means that has ever yet been employed. I have never

* The cascarilla bark, when burning, gives a most agreeable scent to the chambers of the sick, and so is at least an elegant preservative, and may prevent bad smells from taking effect. The steam of boiling camphorated vinegar is still more powerful for this purpose. Vide Lind on Fevers and Infection. p. 51.

once observed the smallest benefit from its use ; and have known many fatal examples of contagion having been communicated where it was constantly employed. But although the steam of boiling vinegar can be of no advantage in destroying contagion, yet, as the smell of it is grateful to the sick, it may for that reason be used about their persons ; and when camphire is dissolved in it, the smell is still more agreeable and reviving.

Washing the furniture, floors, walls, &c. with vinegar, I consider as little better than washing them with simple water. The same may be said of white-washing, as the lime and size can have no particular effect. Oil-painting, another mode of purifying apartments, has little advantage over the preceding ; not to mention the expence and inconvenience attending it.

But enough has been said to shew the general want of chemical knowledge, apparent in all the methods hitherto proposed for

for destroying contagion, and more especially, the inefficacy of the methods employed in places and situations from which people could not be removed ; I shall now proceed to a more agreeable task, and explain those improvements, which a more accurate chemistry, and a long attention to the subject, have suggested to me, and relate some experiments which I made, with a view to ascertain the efficacy of the nitrous acid, and the safety with which it may be used, where people are necessarily present.

The mineral acids, particularly when in a state of vapour, with the different gases or permanently elastic fluids produced by them, are probably, excepting fire, the most powerful agents in nature, and the source of an infinite number of the different forms of matter observable in the mineral kingdom, and which are constantly undergoing fresh changes, from their various combinations, and decompositions. But their power is not confined to the mineral

kingdom; they are known to have great influence likewise over putrefaction, and those other spontaneous changes which vegetable and animal matter, deprived of life, undergoes; and therefore, if the jail contagion, as I have endeavoured to prove, is a vapour produced by putrefaction, there cannot be a doubt that the mineral acids will prove effectual in destroying it. So far we may reason *a priori*; but let us next consult experience, a less fallible guide. From this it appears, that the volatile vitriolic or sulphureous acid, the only one hitherto made use of, proves effectual in destroying contagion; although, owing to its deleterious quality, it cannot be employed, except in situations from which people can be removed. But, are the other mineral acids in a state of vapour equally dangerous with the sulphureous? and, are they equally effectual in destroying contagion? To the first of these questions I can give a positive answer; to the second I can give one that, at least, is highly probable.

In

In the first place, I can safely affirm, that the nitrous acid may be employed in very great quantity without risk, and even without the smallest inconvenience; and, that it is effectual for the destroying of contagion, I have every reason to believe, not only from analogy, but from experience. I had frequently used the nitrous acid, as a fumigation, in hospital wards, and in the private apartments of the sick, without perceiving any unpleasant effect from it; but, to ascertain with more precision a fact of this importance, I made the following experiments; in the conducting of which, Mr. Hume of Long-acre, a very ingenious man, and an excellent chemist, was so obliging as to favour me with his assistance.

We put a mouse, confined in a wire trap, under a glass cylindrical jar, capable of holding about 25 pints beer measure, or 881 cubic inches; the jar was inverted upon wet sand, contained in a flat earthen trough or

pan ; it was then filled with the fumes of the smoking nitrous acid, introduced by means of a crooked glass tube, until the animal could not be very distinctly perceived. The mouse was kept in this situation for a quarter of an hour, when the jar was removed, and the animal exposed to the open air ; it immediately ran about the wire trap, as usual, and had not the appearance of having suffered the slightest inconvenience from its confinement. After a few minutes, the mouse was again put under the glass jar, which was now filled with the vapour of pure nitrous acid, detached from nitre by the vitriolic acid. It remained much about the same time as before, and when the jar was removed, seemed perfectly well.

We repeated the same experiments with a green-finch, only with some little variation in the manner. We placed, on a table covered with green baize, a brown earthen vessel or pan, containing heated sand ;

sand; in this was put a glass saucer, with
 about half an ounce of strong vitriolic
 acid; above which we placed the bird-
 cage, supported with some small pieces of
 wood laid across the pan; then, adding a
 drachm or two of nitre, in powder, to the
 vitriolic acid, we covered the whole with
 the glass jar. The nitrous acid rose in such
 quantity, that, in a very little time, the
 bird seemed as if in a cloud or fog. We
 kept it in this situation fifteen minutes,
 by which time the cloud had disappeared,
 and the acid was in part condensed on the
 side of the glass jar; during the whole
 time the bird neither panted, nor appeared
 to suffer any uneasiness, from the atmo-
 sphere in which it was confined. We
 made trial also of the marine acid, by
 adding common salt, instead of nitre, to
 heated vitriolic acid: during this experi-
 ment, the bird appeared to be, now and
 then, somewhat uneasy, and opened its
 bill; but, at the end of fifteen minutes,
 upon

upon removing the jar, it hopped about as lively as before. We then exposed the bird to the fumes of sulphur, burnt with an eighth part of nitre; it immediately gave signs of uneasiness, opened its bill, and seemed to pant for breath in such a manner, that we were afraid to cover it with the glass jar. We likewise made trial, in the open air, of the oxygenated marine acid*; for, as this is so extremely deleterious, we did not think it safe to expose ourselves to the vapour of it in a room, nor did we venture to expose the bird to it in any other way but in the open air, and even there it appeared to suffer very much.

Having made trial of the effect of the different mineral acids, in a state of vapour,

* The oxygenated marine acid is a discovery of the famous Scheele, and has been recommended by Berthollet and Chaptal, two French chemists, for the purpose of bleaching. I am informed that it has also been lately used in France to destroy contagion, but the particular circumstances, and manner of its application, I have not yet learnt.

upon

upon animals, we determined to render the experiment still more conclusive, by trying what effect they would have on ourselves. With this intention, we filled the room * in which we were with the fumes of nitrous acid, (obtained by mixing nitre with heated vitriolic acid, in the manner already described) until the different objects became somewhat obscure, by a kind of fog or mist produced. The fire irons, and steel fender, lost their polish, and the vapour arising from a bottle of aqua ammoniæ puræ, placed at some distance from the table, was evidently neutralized, as it issued from the bottle, by the vapour of the nitrous acid.

Mr. Hume and I remained in the room the whole time, without perceiving the slightest inconvenience; the fumes did not excite coughing, nor affect the eyes, in the way

* The room in which we made the experiments was a small parlour 13 feet by 10, and 8 feet high; or about 1040 cubic feet.

the

the smোক of wood commonly does, even when I held my head over the glass saucer, and breathed them immediately arising from it. We made trial likewise of the effect of the marine acid, which we found more pungent and stimulating than the nitrous; but, though it excited coughing, it did not cause that constriction of the wind-pipe, and tightness at the chest, with the sense of suffocation, which is immediately induced by the volatile vitriolic or sulphureous acid. Indeed we were imprudent enough to try how far we could breathe this last; but I was instantly obliged to run to the window for air, from the sense of constriction, and of suffocation, which it occasioned. We likewise tried the effect of the mixed fumes of the marine and nitrous acid, a kind of volatile aqua regia, which we found more pungent than the marine acid by itself. As for the oxygenated marine acid, perceiving the effect of it on the bird, and knowing how extremely dangerous

gerous it is, we did not venture to go very near it.

From the preceding experiments, the different acid vapours, in respect to the safety with which they may be breathed, may be arranged in the following order :

- 1st. The vapour of nitrous acid, arising from nitre decomposed by vitriolic acid.
2. Ditto—of nitrous acid in its fuming state, or when the nitrous acid is mixed with nitrous gas.
3. Ditto—of marine acid, arising from common salt, decomposed by vitriolic acid.
4. Ditto—of nitrous and marine acids, obtained from the decomposition of nitre and common salt by vitriolic acid.
5. Ditto—of sulphur, burnt with an eighth part of nitre.
6. Ditto—of sulphur, burnt with charcoal.
7. Ditto

7. Ditto—of oxygenated marine acid*, obtained by putting manganese to marine acid.

As the first vapour is perfectly harmless, in any quantity in which it may be required, it is evidently the most proper to be employed in all situations where people are necessarily present; and if it should prove efficacious in destroying contagion, of which I have not the smallest doubt, it is the *desideratum* †, so much sought after by Dr. Lind; but which he confesses, with his usual candour, he never could find out.

* The oxygenated marine acid is obtained, by distilling marine acid from manganese, but may also be procured in small quantity, by putting manganese to heated marine acid, or by gradually adding a mixture of manganese and sea-salt to heated vitriolic acid.

† A certain method therefore of destroying infection in places from whence persons cannot be removed, is a *desideratum* not yet obtained in physic. I have proposed and tried many things for this purpose without success. Vide Lind's Observations on the Jail Disorder. Edit. published in Oct. 1779.

The

The second, though more pungent than the first, may I believe be employed with the greatest safety; at least, I have never observed any inconvenience from using it. But, as it cannot so easily be procured in considerable quantity, and is attended with greater inconvenience and expence, I have of late years only made use of the first.

Our experiments likewise warrant us to affirm, that the third, or marine acid, though more stimulating, and more apt to excite coughing, than the nitrous, may be safely used, at least in a moderate quantity, where people are present; and where nitre cannot be had, I should have no hesitation in employing it.

Of the fourth I can say but little, only that, in breathing it, I perceived it more pungent than the pure marine acid; and therefore, unless it should be found to possess superior efficacy in destroying contagion, I would not employ it where there are people present.

As

As the fifth never can be used with safety where there are people present, its use must be solely confined to fumigating empty apartments, clothes, furniture, &c.

The sixth should never be employed, as the carbonic acid may do harm, and never can have any effect on contagion.

Of the seventh I have no particular knowledge, only that it is extremely deleterious, and I believe extremely powerful ; but whether it has more effect on contagion than the other mineral acids, experience only can determine.

Having now fully proved that the nitrous, and possibly also the marine acid, obtained in the manner already described, may be employed with perfect safety in hospital and prison wards, whilst the people remain in them, I shall, in the next place, relate how far my experience goes to ascertain the efficacy of those acids in destroying contagion.

From

From all the information I can procure, I do not find that any person has ever made use of the nitrous acid to destroy contagion but myself; for, as this acid is not produced by the deflagration of nitre, or of gunpowder, the employment of these cannot be considered as an instance to the contrary. I formerly mentioned, that I had employed the nitrous acid in two different forms; either the vapour arising from the yellow or smoaking nitrous acid, which is a mixture of the acid with nitrous gas, or the more pure nitrous acid, detached from nitre, decomposed by the vitriolic acid. In one or other of those forms I have used it, both in hospitals and in private practice, for sixteen or seventeen years past; and have had the satisfaction to obtain the most decisive evidence of its happy effect, in preventing the spreading, or farther communication, of contagion.

The most highly contagious fevers that occur in our hospitals, do not affect the
 O patients

patients in general lodged in the same ward, but only the nurses, or those patients who assist them, or those who lie in the beds contiguous to the sick; to such persons I have frequently seen the fever communicated, and have also repeatedly prevented the farther spreading of the disease, by placing gallipots, with the fuming nitrous acid, between the beds of the sick and of those who were not yet affected by the contagion. And, in private practice, I can declare with truth, that where the nitrous acid has been constantly used as a fumigation, I have not known an instance of a contagious fever having been communicated, even to a nurse or an attendant.

These facts will, undoubtedly, be allowed to be very strong evidence, with respect to the power of the nitrous acid to destroy contagion; still, however, they are liable to some uncertainty, and I will freely confess, that the effect of the nitrous acid, for this purpose, cannot be said to be fully proved,
until

until it has been tried in fumigating tainted clothes, &c. and until its power has been found sufficient to destroy contagion on board of ships, and in prisons and hospitals, where it exists in a much higher degree than I have had occasion to see it, excepting at Winchester.

It will probably be asked, why I did not make a complete trial of it there? To this I answer, that with respect to fumigating infected clothes, bedding, &c. I did not think myself warranted, especially on an occasion of so much importance, to make trial of an uncertain remedy, when a certain one was in my power. As to fumigating the prison and hospital wards, it was evidently my intention to have employed the nitrous acid, but I was mistaken in the means I took to procure it, and have not since had a proper opportunity of repeating the experiment.

The effect of the marine acid, in a state of vapour, on contagion, I have not yet had

occasion to try, but have no doubt that it will be found of sufficient efficacy for destroying it; and, from the foregoing experiments, it is evident that, though not so mild or safe as the nitrous acid, it may be used, in a moderate quantity, even where people are present. The only purpose to which I have applied it, has been, when properly diluted, to wash the hammock posts, bedsteads, and furniture; also the floors, and walls, of the apartments of the sick *: and I am persuaded that, even in this way, it was extremely serviceable, certainly more powerful than the most concentrated vinegar.

I shall now conclude this subject with a few practical rules or observations, which may be looked upon as corollaries, or inductions, from the preceding experiments.

* The washing the hammock posts, walls, and floors of the prison wards with the diluted marine acid, and the removal of all clothes, bedding, &c. proved completely effectual for destroying the contagion at Winchester; as it is now apparent, that the burning or deflagrating of nitre could contribute nothing to the success.

The

The well known efficacy of the sulphureous acid, in destroying contagion, is a sufficient reason for our continuing to use it as a fumigation for clothes, furniture, &c.

The nitrous acid, being attended with no risk or inconvenience to the respiration, and appearing, from our experience, of sufficient efficacy to prevent the farther spreading of contagion, seems the proper antidote to be applied, in all situations where persons are necessarily present, and is, in short, the *desideratum* sought after by the benevolent Dr. Lind.

For purifying empty hospital or prison wards, and ships, I should also prefer the nitrous acid to the sulphureous; as I believe it to be equally efficacious; its vapour is more volatile and penetrating; and it does not leave the disagreeable smell which sulphur does. But, for this particular object, I think it would be advisable to make trial also of the marine acid, and of the mixture of nitrous and marine acids,

as I am convinced of the efficacy of all the mineral acids for destroying contagion, and our experience is not yet sufficient to determine their relative advantages, and disadvantages.

To obtain the nitrous, or marine acid, in a state of vapour, the method is extremely simple. It consists in decomposing nitre, or common salt, by means of heated vitriolic acid, which may be done as follows :

Put half an ounce * of vitriolic acid into a crucible, or into a glass or china cup, or deep saucer ; warm this over a lamp, or in heated sand, adding to it from time to time some nitre or common salt : these vessels should be placed at twenty or thirty feet distance from each other, according to the height of the ceiling, or virulence

* As the quantity of vapour depends, in some measure, on the surface, I think it better to have the vitriolic acid put in a number of small vessels, than in one or two large ones ; besides, in this way, it has the advantage of being diffused more readily in any given space.

of the contagion. In hospitals, or prisons, the lamps, or vessels containing heated sand, may be placed on the floor; on board of ships, it will be better to hang them to the ceiling by waxed silk cords. The fumigating lamps, which I have seen at Moyser's, in Greek-street, Soho, a great number of which I was told have been sold to the navy, may be employed for this purpose; although they would answer much better, if the saucer was deeper, and if, instead of a place for a lamp, there was a box proper for containing hot sand, in which the saucer might be placed.

As fumigating with nitrous acid is attended with no inconvenience, and as the process is so simple, and the materials so cheap, it should, as a means of prevention, be employed for some hours every day in transports having troops on board, and in crowded hospitals; and, if there is any appearance of contagion, the fumigation should be executed with more care

and attention, and the vapour confined for several hours at a time. Fumigating vessels, or lamps, should also be placed contiguous to the hammocks, or beds, of persons affected with any contagious or putrid distemper, whether fever or dysentery.

By taking such precautions, a great deal of mischief would probably be prevented, and a stop put, in the beginning, to one of the most fatal calamities * that ever afflicted mankind.

* The late dreadful mortality in the West-India islands, occasioned by a contagious fever imported from Boulam, has made too deep an impression on the minds of the people of this country to be soon forgotten, and every exertion on the part of the executive government will no doubt be made to prevent a repetition of the same tragedy.

SINCE writing the above, I have had the pleasure of seeing the last publication, and, as I imagine, the latest improvements, of the French chemists and physicians on the subject of contagion, and on the proper means of destroying it. It is intitled, "*Instruction, sur les moyens d'entretenir la salubrité, et de purifier l'Air des Salles, dans les Hopitaux militaires de la République, fait au Conseil de Santé le 5 Ventose, l'An 2d de la République française une et indivisible.*"

This *instruction*, or *memoire*, is divided into three parts. The first relates solely to the means of cleanliness; the second to what are called the mechanical means; and the third to the chemical. The two first parts contain nothing new or interesting; the third is of the greatest importance to medical science, and particularly so to me,

as

as it furnishes a proof of the accuracy of some of the preceding experiments, and is a complete confirmation of the opinions I have long entertained respecting the nature of contagion, and the power of the mineral acids to destroy it.

The French physicians, instructed by that excellent chemist *Le Citoyen* Guiton, better known by the name of *Monsr. de Morveau*, of *Dijon*, have lately made trial of the marine acid in their hospitals, and have found it equally effectual in destroying contagion as the sulphureous, and, as being more volatile, perhaps even preferable for the purpose of purifying hospital wards. They also remarked that, in a smaller proportion, it may be safely used in hospital wards, even when people are present *. The French physicians however have not employed the nitrous acid, nor made any trials of its effect on

* My experiments shewed the same thing.

contagion ;

contagion ; neither do they appear to have suspected that the power of destroying contagion was a quality inherent in all mineral acids ; and probably, to a certain degree, in all acids, under certain circumstances. Although their experience of the effect of the marine acid, together with my observations on that of the nitrous, seem to establish the fact beyond the cavil of scepticism itself.

Their method of obtaining the marine acid is the same that I took to procure the nitrous ; they either employed the fuming marine acid, or the acid detached from its alkaline basis by vitriolic acid, using a considerable degree of heat for that purpose *. They likewise, upon the suggestion of M. Fourcroy, recommend adding a small quantity of the oxygenated marine acid ; but, as they do not pretend to say that they

* The reader will find at the end an account of their process.

have had any experience of the superior efficacy of this, and as the common marine acid has been found to answer the purpose, I do not see any reason for making so hazardous an addition.

Another chemical process for purifying foul air in hospitals, recommended in this *instruction*, deserves our notice. It consists in placing, at different distances in the hospital wards, vessels with lime water, for the purpose of absorbing carbonic acid or fixed air. I am inclined, however, to believe, that this advice is more the result of chemical theory than of practical observation; for I do not suppose that carbonic acid is ever present, (where there is a free admittance of air,) in sufficient quantity to prove hurtful; at least, it can only affect the breathing, and has nothing in common with contagious vapour.

The French physicians appear to me to have fallen into a considerable mistake on this subject, in taking the quantity of

carbonic acid present *, in an hospital, as a test of the quantity or malignity of contagion, when, in reality, they are two things. totally distinct from each other. The first, or carbonic acid, is a constituent part of the common or atmospheric air, which is greatly increased by the respiration of animals, and by burning candles, lamps, &c. and, when in too great quantity, extinguishes flame, and animal life : the other has no relation with the composition of the atmosphere, never affects respiration, but is produced by putridity, and excites fever.

* The method proposed by the French physicians, for ascertaining the quantity of carbonic acid present, is simple and ingenious. Take two phials ; let one be filled with common water, the other with lime water. At the place where you want to try the purity of the air, empty the phial of common water, then, filling it half full with lime-water, and corking it, shake the phial for some time : the quantity of sediment shews the proportion of carbonic acid. But, to render the preceding experiment conclusive, the height from the ground at which the air is taken should be stated, otherwise we are liable to great fallacy.

Extract

Extract from the “ *Instruction, sur les*
 “ *Moyens d'entretenir la salubrité, et de*
 “ *purifier l'Air des Salles dans les Hôpi-*
 “ *taux militaires de la Republique, &c.*
 “ *&c. &c.*”

“ *Au nombres des moyens que la chimie a*
 “ *employés avec un succès que tient du prodige*
 “ *pour operer cette depuration, nous citerons le*
 “ *procedé que Guiton, (Mons. de Morveau)*
 “ *representant du peuple, a mis en usage*
 “ *en 1773, dans la ci-devant cathedrale de*
 “ *Dijon, infectée par des exhumations, au*
 “ *point qu'on fut obligé de l'abandonner.*

“ *Ce moyen consiste à repandre dans l'at-*
 “ *mospheere, de l'acide muriatique (acide ma-*
 “ *rin) en etat de gaz degagé par l'intermède*
 “ *de l'acide sulphuric ; (huile de vitriol) voici*
 “ *le procedé pour désinfecter une salle de 40*
 “ *a 50 lits.*

“ *Après avoir évacué les malades sur une*
 “ *des salles de rechange, disposez dans le milieu*
 “ *de*

“ de la salle vuide, dont les fenêtres & les
 “ portes seront fermées, un fourneau garni
 “ d’une petite chaudière ou capsule de fer,
 “ à demi remplie de cendre tamisée sur
 “ laquelle on posera une capsule de verre
 “ de grès, ou de fayance même, chargée de
 “ neuf onces de muriate de soude, (sel marin,)
 “ légèrement humectée avec une demi-once au
 “ plus d’eau commune. Le feu étant allumé
 “ à la capsule échauffée, on versera sur le
 “ sel marin quatre onces d’eau sulfurique,
 “ ou huile de vitriol de commerce. En un
 “ instant l’acide sulfurique agira sur le sel
 “ marin, dont l’acide se mettra en expansion;
 “ l’opérateur, qui sera le pharmacien en chef,
 “ ou un de ses aides, versé dans le manuel des
 “ opérations chimiques, se retirera, en fermant
 “ la porte sur lui, et emportant la clef; douze
 “ heures après on entrera dans la salle, on
 “ ouvrira portes et fenêtres, pour établir des
 “ courans d’air, et évacuer celui qui pourroit
 “ être encore chargé d’acide. On donnera
 “ une plus grande latitude d’utilité à ce pro-
 “ cédé

“ cédé en l'appliquant aux salles même rem-
 “ plies de malades, toutes les fois que les
 “ officiers de santé le jugeront nécessaire.
 “ Ainsi lorsqu'on aura reconnu que l'air d'une
 “ salle est surchargé de miasmes animaux,
 “ et a besoin de cet excellent purificateur,
 “ il suffira de faire le tiers du mélange ci
 “ dessus, et même moins, et de la parcourir
 “ plus ou moins lentement, & dans tout les
 “ points, le rechaud à la main, au moment
 “ où le gaz se met en expansion.

“ Lorsque la salle sera jugée suffisamment
 “ rempli de gaz acide muriatique, on trans-
 “ portera l'appareil dans les latrines, afin
 “ que les dernières portions gazeuses que le
 “ mélange pourra continuer de fournir servent
 “ à neutralizer les gaz ammoniacaux pu-
 “ trides, qui se developpent continuellement
 “ dans les privés.

*Letters * from the Commissioners of sick and wounded Seamen to the Author, respecting the Jail Distemper at Winchester.*

Office for sick and wounded Seamen,
30th May, 1780.

S I R,

AS you have so obligingly consented to favour us with your assistance to the sick Spanish prisoners at Winchester, we trouble you with the enclosed letter to our agent and surgeon, to give you every information respecting the directions they are under for the treatment of the prisoners in health, as well as the sick ; and they are directed to pay a due attention to whatsoever you shall recommend to be done for the regula-

* These letters were thought necessary to explain some facts, and will serve as vouchers for others.

P

tion

tion of the hospital. And if you judge that any alteration in the diet or mode of treatment of the prisoners in health is necessary, we are to desire you will please to favour us with your sentiments upon that subject; and that you will communicate to us what at any time you may judge necessary, concerning the service in general.

We very sincerely wish you health, and hope we shall shortly have the pleasure to learn your endeavours have been attended with the happiest success. We are,

S I R,

Your most obedient,

humble servants,

J. BELL,

WALTER FARQUHARSON,

VIN. CORBETT,

ROB. LULMAN.

S I R,

Office for sick and wounded Seamen,
the 5th June, 1780.

S I R,

WE received this morning, by express, your favour of the 4th. We were very glad to learn that the assistance of Mr. Curtis, the Spanish priest, whose influence over the prisoners we had reason to believe might be very serviceable, had been procured.

We shall give directions to the agent for the having the prisoners obliged to give up their clothes and bedding, in order to their being well fumigated, labelled and put in store, and shall apply to Mr. Gandasequi, the Spanish agent, to have them supplied with new ones; and fresh hammocks, &c. will be ordered out of store; and we shall write to Mr. Lulman, to make the necessary application to the military to assist in the carrying these directions into execution, should the prisoners,

P 2

notwith-

notwithstanding what may have been urged and explained to them by Mr. Curtis, continue to resist the means used for their safety.

Dr. Lind having so lately been at Winchester, on account of the sickness prevailing there, we were very much concerned upon the return of the two members of our board, who lately went to Winchester, to learn that the wards of the hospital were so crowded. As the necessity of enlarging it was so obvious, and the doing it so easy, we wrote, by the post of the very day they returned, to the agent and surgeon, to employ such wards in the prison as lay nearest to the hospital, and were most separate from the other prison-wards, as an addition to the hospital, and gave them other proper directions upon the point.

We shall renew our standing orders, for the prisoners being inspected in the prison-wards every day, to see who are objects for the hospital.

We

We were happy to be informed, that the wards of the prison and hospital were found clean, and make no doubt the different nuisances complained of, arising from drains and soil-pits, will be speedily removed; and it is with great satisfaction we flatter ourselves, that the various means proposed to be used under your direction, to subdue the infection, will soon prove successful.

We beg to know your opinion, together with Mr. Lulman's, whether, upon the present view of things, the project of encamping the well prisoners, to which it had appeared to yourself, as well as to us, that it might be necessary to have recourse, may not now be dropt; as that of applying the Magdalen house as an hospital very properly is, for the reasons which have been explained to us.

We shall give directions for completing the shed you mention, and every other means you shall think necessary for the

great end of restoring health to the prisoners, you may be assured will meet with our most ready concurrence. We are, with the greatest truth and regard,

S I R,

Your most obedient, and
most humble servants,

J. BELL,
WALTER FARQUHARSON.

Office for sick and wounded Seamen,
the 6th June, 1780.

S I R,

MR. James Parsons, of Stratford, having desired us to permit trial to be made of the efficacy of oil and tar, to be used in the prison at Winchester, as also an acid water drawn from tar to be used in washing the

the floors of the apartments, we consented to his sending samples, addressed to Mr. Smith, our agent; and we shall be much obliged by your favouring us with your opinion, whether any beneficial effects may reasonably be hoped for, from the use of it; and, in that case, we would order a proper quantity to be forwarded, without the least loss of time. We are,

S I R,

Your most obedient,

humble servants,

J. BELL,

WALTER FARQUHARSON,

VIN. CORBETT.

Office for sick and wounded Seamen,
the 9th June, 1780.

S I R,

WE were extremely glad to receive confirmation, by your letter of to-day, of the good account we had from Mr. Lulman respecting your state of health.

We troubled you for your opinion respecting the oil and acid water of tar, because it had been mentioned to us, in a manner that seemed to justify a trial of it; but we are now confirmed in the opinion we before had of it, and that much more is to be hoped for, from the other means that are using.

It is extremely painful to us to learn, that your endeavours at Winchester are not seconded by every attention in our officers; and we have wrote to Mr. Lulman, to enquire who is particularly culpable, in suffering dirty cradles and beds to be put into
into

into the new sick wards, that the notice such a negligent discharge of their duty requires, may be taken of them.

We are very glad to observe you have hopes of a sensible alteration shortly for the better, among the prisoners at Winchester, and sincerely wish it may answer the endeavours of yourself, and Mr. Lulman. We are,

S I R,

Your most obedient,

humble servants,

J. BELL,

WALTER FARQUHARSON.

A private

*A private Letter from Mr. Commissioner
Lulman.*

Winchester, July 18, 1780.

DEAR SIR,

I sincerely hope, by this time, you have recovered from the disagreeable situation in which you left Winchester ; in the knowledge of which, none of your friends will more heartily rejoice.

On the evening of the day you left me, I received a letter from the Board, requesting me to stay till the hospital alterations were entirely executed : on Tuesday every thing will be finished, and on Wednesday morning shall leave Winchester. I shall, with great pleasure, take the earliest opportunity of waiting upon you. The number of deaths last week, are reduced to twelve ; and the good success attending the methods you have ordered, becomes
every

every day more visible, and will, I make no doubt, end both to your credit and satisfaction.

I hope you have found Mrs. Smyth well; to whom, I beg you will present my best respects.

Enclosed I have sent a letter, which arrived here on Friday. I am,

DEAR SIR,

With the greatest esteem,

Your sincere friend,

and humble servant,

R. LULMAN.

Reso-

Resolutions of the House of Commons, upon the Report made from the Committee, appointed to enquire into the State of the Health of the Prisoners, confined in the King's House, at Winchester; and the Proceedings of the House thereupon.

Resolved,

THAT it appears to this Committee, that the disorder which has reigned in the Prison at Winchester originated with the Spanish prisoners, and was the consequence of an infection brought on shore with them when first landed; supposed to be contracted by the length of their confinement on board of ship in the winter season, and in great measure by their own indolence, and want of cleanliness.

Resolved,

That it appears to this Committee, that the distemper is a contagious malignant

nant fever, of the gaol kind, but not a pestilence; the contagion having never communicated itself to the inhabitants of the town, though several of the attendants of the hospital, who were seized with it, were brought into the town, and died there.

Resolved,

That it appears to this Committee, that the disorder is not only greatly decreased, but from the wise and prudent regulations that have been taken, bids fair to be soon totally extinguished.

Resolved,

That it is the opinion of this Committee, that the Commissioners of sick and wounded have exerted themselves to the utmost, and been highly meritorious, in taking every measure that could be suggested to stop the progress of so great a calamity.

Resolved,

Resolved,

That it is the opinion of this Committee, that by the skill and ability of, and the measures pursued by, Doctor James Carmichael Smyth, physician of the Middlesex hospital (whom the Commissioners of sick and wounded procured to go to Winchester upon this occasion) the violence of the distemper reigning among the prisoners there was first checked, and has been in a state of decrease ever since; the number of the sick in the hospital being reduced upwards of one hundred, and the burials in the two last weeks having amounted only to five in each.

The said Resolutions being read a second time, were agreed to by the House.

Resolved, nemine contradicente,

That an humble address be presented to His Majesty, that He will be graciously pleased to take the merits of the said Doctor James Carmichael Smyth into His
royal

royal consideration, and to confer upon him such mark of His Majesty's favour, as His Majesty in His royal goodness may think fit.

Ordered,

That the said address be presented to His Majesty by such members of this House as are of His Majesty's most honourable Privy Council.

Ordered,

That the said Report, with the Appendix thereunto, and the Proceedings of the House thereupon, be printed.

APPEN-

A P P E N D I X.

Office for sick and wounded Seamen, &c.

A Weekly progressive State of the Sicknefs and Mortality among the Spanish Prisoners, confined in the King's House, at Winchester, from the first Appearance of the Jail Dis-temper, until the 8th of July 1780.

Date of Weekly Accounts.	Number of Spanish Prisoners.		
	In Custody.	Sick.	Dead.
March 26, 1780 —	1247	60	1
April 2, —	1243	106	4
9, —	1475	150	10
16, —	1457	172	18
23, —	1433	142	21
30, —	1412	171	21
May 7, —	1388	191	25
14, —	1351	197	27
21, —	1523	205	30
28, —	1494	226	31
* June 3, —	1461	262	33
10, —	1437	212	26
17, —	1426	173	9
24, —	1420	167	5
July 1, —	1414	143	5
8, —	1433	122	2

* The time of Dr. Carmichael Smyth's going to Winchester.

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*Memorial presented to the Right Honourable
Lord North, &c. &c. &c.*

*As the present publication may possibly fall into
the hands of some persons, whose friendship
leads them to take an interest in every thing
which respects the author, on their account
the following Memorial is inserted. Others
may consider it as so many blank pages,
which have not increased the expence, and
have added little to the size, of the volume.*

(C O P Y.)

To the Right Honourable Lord North,
&c. &c. &c.

THE MEMORIAL OF
DOCTOR JAMES CARMICHAEL SMYTH.

YOUR memorialist feels a satisfaction
which no emolument can yield, in the very
honourable mark of distinction he has re-

Q 2

ceived

ceived from the House of Commons, by their address to His Majesty in his favour; he entertains likewise the most grateful sense of the countenance your Lordship was so kind as to give it in the House, and is thereby encouraged to hope that you will have the goodness to support it, by your favourable recommendation to the King.

To enable your Lordship to do this with the greater propriety and force, your memorialist has taken the liberty, briefly, to state to you some of the principal circumstances relative to his conduct, and services, at Winchester.

In the first place, he thinks it necessary to observe to your Lordship, that previous to his going there, the sickness and mortality were daily increasing; and, notwithstanding the advice, and for some time the attendance, of two physicians of eminence, had arisen to an alarming height.

The number of deaths exceeded thirty a week, and the number of sick in the hospital,

hospital, which amounted on the first of June to about two hundred and twenty, increased in four or five days after to two hundred and seventy-eight; and, considering that the hospital was already too crowded, there is great reason to conclude, that had not an immediate and effectual check been given to the distemper, the mortality would have increased in proportion to the sickness.

That the measures pursued by your memorialist were of efficacy in abating the contagion, is evident from the great and sudden decrease in the *hospital list*, which, in ten days time, was reduced one hundred and five; and that these measures, if fully carried into execution, would have entirely destroyed the contagion, is at least extremely probable, as none of those Spaniards who were washed in the river, new clothed, and lodged in the purified prison wards, were seized with the distemper during the time that your memorialist remained at Winchester.

By an unfortunate mistake between Mr. Gandasequi the Spanish agent, and his deputy, there were only three hundred suits of clothes issued; a number by no means sufficient to make the change required for the purification of fifteen hundred men.

Nor was it possible (however necessary) without compulsion, to take from the Spaniards all their old clothes and bedding, which are known to retain so powerfully the seeds of contagion.

That the enlarging the hospital, the new arrangements made, and the directions given by your memorialist, for the treatment of the sick, were attended with the happiest consequences is clearly proved, from the alteration in the weekly returns: the number of deaths the week after these regulations took place were reduced to nine; the two following weeks to five in each, and this last week to two.

Respecting

Respecting the hospital, it is perhaps proper to inform your Lordship, that the sick were attended by some of their fellow prisoners, who, as their services were voluntary, could not be punished for neglect of duty; nor could they be induced by promises or rewards to pay that strict attention to cleanliness, and to the regular administering of medicines, so necessary in cases of this kind.

It should also be known to your Lordship, that the prisoners, from an aversion to go into the hospital, frequently concealed their indisposition till it was out of the reach of medical assistance.

Your memorialist begs leave further to represent to your Lordship, that, in two instances, he was the occasion of a very considerable saving to government.

In the first place, by fitting up, as an additional hospital, a part of the prison adjoining to it, and at the same time, by lessening the number of the sick, he prevented the
Q 4
necessity

necessity of hiring and fitting up the Magdalen house; a measure, which was almost concluded on by the Board for sick and hurt, but which, if adopted, must have cost a very considerable sum of money.

Secondly, He prevented the expence of encamping the prisoners on the airing ground, which was looked upon, at the time he left London, as the only expedient for abating the contagion remaining untried; and application was accordingly made, by the Commissioners, to the Lords of the Admiralty, for orders to that effect.

Your memorialist flatters himself, that he will stand excused to your Lordship if, as an additional claim to your protection and support, he should presume, before concluding this memorial, to mention some circumstances relating only to himself.

Your memorialist is persuaded, that the Commissioners for sick and hurt will do him the justice to say, that he went to
Winchester

Winchester upon application being made to him by that Board, without stipulating for any pecuniary gratification; and he can with truth affirm, that no pecuniary reward could have induced him, at that time, to have left his family, and quitted his business, to engage in so hazardous an enterprise. He was fully apprized of the danger and difficulty attending it; he knew that others, who had been applied to, had declined it from considerations of private interest, or of personal danger; he knew that he was to risk not only his professional character, but his life, in the attempt, as most of the officers and servants belonging to the hospital, and prison, had fallen victims to this fatal distemper.

Your memorialist soon experienced, that the reports of the contagious nature of the disease were not exaggerated, nor the apprehensions of danger imaginary: the fourth day after his arrival at Winchester, he was seized in a very violent manner with the fever;

fever ; but neither this unfortunate accident, nor the situation of his family in town, left unprotected in the midst of flames and riots, could turn him aside from the line of his duty, nor force him to quit an undertaking, in which he felt the interests of humanity, as well as the national honour, so deeply concerned ; even when unable to hold the pen, and during the intervals of the operation of a violent emetic, he continued to dictate instructions for the surgeon, and regulations for the management of the hospital ; being apprehensive lest the fever, by seizing his head, might soon render him incapable of doing this.

Your memorialist, the night before he left Winchester, suffered another very violent attack of the distemper, which, after his return to town, confined him to his bed for several days, and left him in a state of weakness, from which he has not as yet perfectly recovered.

But these, my Lord, are only the sufferings of an individual, which are commonly forgotten as soon as the purpose is served ; your memorialist, however, is not afraid of this being the case in the present instance ; his endeavours to serve his country have been attended with a success which even his friends could hardly expect, and which he believes stands without example in the annals of physic. He has already received from the public the fullest approbation of his conduct, and makes no doubt that, in consequence of your Lordship's favourable representation of it to the King, he shall receive from His Majesty (ever attentive to reward merit in the lowest of His subjects) some mark of His Majesty's royal favour *.

* His Majesty, some time after, was graciously pleased to appoint the memorialist one of his physicians extraordinary.

The

The following Formulae of Medicines are not given to the public as specimens of elegance, or of accuracy in composition; they were written in haste for the occasion, and are only now published as constituting a necessary part of the practice in the hospital at Winchester.

Formulae Medicamentorum, in usum Nosocomii Wincesterensis, conscriptæ.

1. *Mistura emetica.*

R. Tart. emet. gr viij.

Aq. puræ distillat. ʒ viij M.

Dosis coch. ij ad iv. sing. horæ 4tibus
donec evomuerit æger.

2. *Pulvis antimonialis.*

R. Tart. emet. gr ij.

Calc. antim. illot.

Test. ostreor. pp. aā ʒ j tere
probe simul ut f. pulvis.

Dosis gr vij. ad gr xij.

3. *Bolus antimonialis.*

R. Pulv. antim. gr vij ad xij.

Conserv. cynob. ʒ j M.

4. *Bolus*

4. *Bolus antimonialis cardiac.*

R. Pulv. antim. gr vij ad xij.

Confect. cardiac ʒj ad 3fs M.

5. *Bolus antim. cum philon.*

R. pulv. antim. gr viij.

Philon. Lond. gr xv. M.

6. *Bolus antim. laxans.*

R. Pulv. antim. gr x.

Electar. lenitiv. 3fs M.

7. *Julep menth. vitriol.*

R. Aq. menth. ℥j.

Spirit. vitriol. dulc. ʒij.

Sacch. alb. 3fs M.

Dosis ʒij 4tis vel 6tis horis.

8. *Julep c. camph. c.*

R. Julep c. camph. Ph. Lond. P ij.

Sp. Minder. Ph. Ed. Pi M.

Dosis ʒij 4tis vel 6tis horis.

9. *Bolus peruvianus.*

R. Gort. peruv. pulv. 3fs ad ʒij.

Syrup croci. q. f. M.

10. *Bolus*

10. *Bolus peruv. card.*

R. Cort. peruv. pulv. ʒss.

Confect. card. ʒj.

Syrup croci. q. f. M.

11. *Bolus peruv. volat.*

R. Bolum peruv.

Sal. volat. C. C. gr viij. ad xv M.

12. *Bolus peruv. acid.*

R. Bolum peruv.

Elix. vitriol Mynsicht. gutt. xij ad

xx. M.

13. *Bolus e moscho.*

R. Mosch. pulv. ʒj.

Conserv. cynosb. q. f. M.

14. *Bolus e mosch. card.*

R. Mosch. pulv. gr xij ad ʒj.

Confect. card. gr. xv M.

15. *Bolus e mosch. volat.*

R. Bolum e mosch.

Sal. volat. C. C. gr x ad xv M.

16. *Hausius*

16. *Haustus peruvianus.*
 R. Decoct. cort. peruv. ℥ i fs.
 Tinct. — Huxh. ℥ ss.
 Pulv. — ʒj ad 3 fs. M.
17. *Haust. peruv. c. opio.*
 R. Haust. peruv.
 Tinct. thebaic. gutt. v. ad xij. M.
18. *Haust. peruv. card.*
 R. Haust. peruv. fine pulv. cort.
 Confect. cardiac. ʒj M.
19. *Haustum peruv. anod.*
 R. Haust. peruv.
 Liq. anod. min. Hoffm. gutt. xx. M.
20. *Haust. peruv. c. acido.*
 R. Haust. peruv.
 Elix. vitriol. M. gutt. xij ad xx. M.
21. *Haustus laxans.*
 R. Infus. fen. com. ℥ i fs.
 Tinct. jalap ʒj.
 Mannæ.
 Sal. cathart. amar. āā ʒij M.

22. *Electarium*

22. *Electarium laxans.*

R. Electar lenitiv. ℥ i ss.

Sal. nitri ʒ ss.

Rad. jalap. pulv. ʒ ij. M.

Dosis magn. N. M. pro re nata.

23. *Enema laxans.*

R. Decoct. malvæ ℥ xiv.

Sal. nitri ʒ i.

— cathart. amar. ℥ ss. M.



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APPENDIX:

CONTAINING
AN ACCOUNT OF THE EXPERIMENT
MADE AT THE DESIRE OF
THE LORDS COMMISSIONERS OF THE ADMIRALTY,
ON BOARD THE
UNION HOSPITAL SHIP, IN 1795, &c.
TO DETERMINE THE EFFECT OF THE
NITROUS ACID IN DESTROYING CONTAGION,
AND THE
SAFETY WITH WHICH IT MAY BE EMPLOYED.
BY
A. MENZIES, SURGEON.
*Published with the Approbation of the Lords Commissioners of the
Admiralty.*
THE SECOND EDITION.

THE
NATIONAL
ARCHIVES
COLLECTION
OF
THE
UNITED STATES
GOVERNMENT
1901-1902

THE RIGHT HONOURABLE

E A R L S P E N C E R,

&c.

MY LORD,

THE general opinion entertained of your Lordship, in the high department, at the head of which you are placed, is the only apology I can offer for having taken the liberty to trouble you on the subject of the following publication. The immediate attention paid to this by your Lordship, and by the rest of the Lords Commissioners of the Admiralty, is extremely flattering to me, as an individual, and claims my warmest gratitude ; but it is of much more importance, my Lord, as holding out to the nation, a well-grounded confidence, that no object which may be conducive to the public service, or to the preservation of those brave men, the pride and protectors of their country, can long escape your Lordship's notice. I have now the honour to lay before you, and the rest of the Lords Commissioners of the Admiralty, an account of the Experiment made on board the *Union*, at your Lordship's desire, and likewise of those trials that were made at the desire of the Russian Admiral, and with your Lordship's approbation, on board some ships of his squadron. I consider myself, in executing this task, as only performing a duty I owe to your Lordship, and which I do

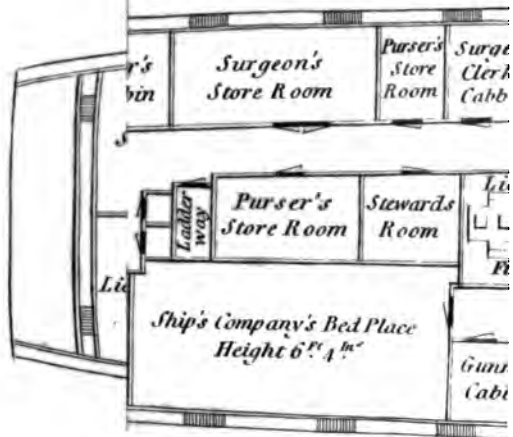
with the greater pleasure, as it may possibly be the means of making public a discovery which should be universally known ; and as the only way in my power to bring forward the merit of those Gentlemen, to whose assistance I have been particularly indebted for the fortunate issue of this experiment, and from whose reports I am enabled to present your Lordship with an account of the manner in which it was conducted, and of the particular effects it produced.

Mr. Menzies, late Surgeon to his Majesty's sloop the Discovery, was the person who, at my request, very obligingly undertook the management of the experiment on board the Union ; and it is but doing him justice to say, that I could not have found a gentleman better qualified, in every respect, for executing so important a trust. I shall therefore, my Lord, without farther preface, lay before you, and the rest of their Lordships, Mr. Menzies's journal, as affording a better description of the experiment, so long as he continued to conduct it, than any I can offer.

J. C. S.

produced the orders of the Admiralty to 1

PLAN of



REPORT OF THE EXPERIMENT

MADE WITH

NITROUS ACID,

FOR

STOPPING THE PROGRESS OF CONTAGION,

AS EXECUTED ON BOARD

THE UNION HOSPITAL SHIP, AT SHEERNESS,

BY

MR. ARCH. MENZIES, SURGEON.

DOCTOR James Carmichael Smith having been requested, by the Lords Commissioners of the Admiralty, to send a person on board the Union Hospital Ship, lying at Sheerness, to make trial of the effect of a fumigation of the Nitrous Acid, and other means recommended by him in a late publication, for destroying Contagion, I readily engaged, upon application being made to me by one of our common friends, in the execution of the experiment which I foresaw might eventually be of much benefit to society, and particularly to the service, to which I have the honour to belong.

After having, therefore, received instructions, and obtained every necessary information on the manner of conducting the fumigation, I left London on the 24th of November, 1795, and arrived at Sheerness the same evening.

Next morning I waited on Admiral Buckner, the commanding officer of the port, whose politeness and zeal to promote the object of my journey were equally conspicuous, and deserve my most grateful acknowledgment.

I afterwards went on board the Union, where I produced the orders of the Admiralty to Lieut-

tenant Quarme, the commanding officer, and Mr. Bassan, surgeon of the ship, who received me with cordiality, and readily offered every assistance in their power to carry on the experiment, upon the event of which not only the safety of the ship's company, but, perhaps, their own, in great measure, depended.

On examining the state of the hospital, I plainly foresaw that fresh contagion would be daily pouring into it from the Russian vessels, under which disadvantageous circumstance, it would be difficult to decide on the success of our endeavours. The lower and middle gun-decks were divided into large apartments, or wards, by cross partitions, with a free communication between each*: they were extremely crowded, and the sick of every description lay in cradles, promiscuously arranged, to the number of nearly two hundred; of which about one hundred and fifty were in different stages of a malignant fever, extremely contagious, as appeared evident from its rapid progress, and fatal effects, amongst the attendants on the sick, and the ship's company. For, from the beginning of September last, when the Russian sick were first admitted into the hospital; eight nurses and two washer-women had been attacked with this fever, and of these three had died. About twenty-four of the ship's company had likewise been ill of the same disorder, and of these a surgeon's mate and two marines died. Upon the whole, however, the mortality had not been so great as there were reasons to dread, from the virulence of the contagion, and malignity of the disease; which can only be ascribed to the great care and attention of Mr. Bassan, surgeon to the hospital, whose conduct in so critical a situation does him the highest honour, and reflects lustre on his professional abilities, in the faithful discharge of so unpleasant a duty.

After I returned on shore from the Union, I em-

* To give a more exact idea, I refer to the drawing of the ship which accompanies this journal.

ployed the rest of the day in collecting and sending on board such utensils and materials as were required for fumigating the ship; these consisted of a quantity of fine sand, about two dozen quart earthen pipkins, and as many small common tea-cups, together with some long slips of glass to be used as spatulas; the other materials I had brought with me from town, viz. the concentrated vitriolic acid, and a quantity of pure nitre in powder.

On the forenoon of the twenty-sixth, I went again on board the Union. I first ordered all the ports and scuttles to be close shut up; the sand, which had been previously heated in iron pots, was then scooped out into the pipkins by means of an iron ladle, and in this heated sand, in each pipkin, a small tea-cup was immersed, containing about half an ounce of concentrated vitriolic acid, to which, after it had acquired a proper degree of heat, an equal quantity of pure nitre in powder was gradually added, and the mixture stirred with a glass spatula, until the vapour arose from it in considerable quantity. The pipkins were then carried through the wards, by the nurses and convalescents, who kept walking about with them in their hands, occasionally putting them under the cradles of the sick, and in every corner where any foul air was suspected to lodge. In this manner we continued fumigating, until the whole space between decks was, fore and aft, filled with the vapour, which appeared like a thick haze.

I however proceeded in this first trial slowly and cautiously, following with my eyes the pipkins in every direction, to watch the effect of the vapour on the sick, and observed that at first it excited a good deal of coughing, which gradually ceased, in proportion as it became more generally diffused through the wards; this effect appeared indeed to be chiefly occasioned by the ignorance or inattention of those who carried the pipkins, in putting them sometimes too near to the faces of the

sick, by which means they suddenly inhaled the strong vapour, as it immediately issued from the cups.

In compliance with Doctor Smyth's request, the body-clothes and bed-clothes of the sick were, as much as possible, exposed to the nitrous vapour during the fumigation; and all the dirty linen removed from them was immediately immersed in a tub of cold water, afterwards carried on deck, rinsed out, and hung up till nearly dry, and then fumigated before it was taken to the wash-house: a precaution extremely necessary in every infectious disorder. Due attention was also paid to cleanliness and ventilation.

As the people were at first very awkward and slow, it took us about three hours to fumigate the ship; in about an hour after, the vapour having entirely subsided, the ports and scuttles were thrown open, for the admission of fresh air. I then walked through the wards, and plainly perceived that the air of the hospital was greatly sweetened, even by this first fumigation.

Next morning the ship was again fumigated, beginning with the lower deck, and the people employed being now better acquainted with the operation, were more expert, and finished the whole in about an hour's time; in an hour afterwards, the vapour having entirely subsided, the fresh air was freely admitted into the hospital.

This day the sand was made hotter, and the fumigation was of course much stronger, yet the patients suffered no other inconvenience from it than a little coughing, and even that was not near so general as the day before.

Twelve pipkins were found sufficient for fumigating the lower deck, ten for the middle gun deck, two for the ship's company's bed-room, two for the marines' bed-room, and one for the washing place; in all twenty-seven pipkins. Consequently, about fourteen ounces of the vitriolic acid, and as much nitre, were expended in the forenoon; but, in the

evening, as every place was so close, and the fresh air could not be afterwards so freely admitted, it was not thought necessary to employ so many pipkins; so that little more than half the quantity of the fumigating materials used in the morning, was generally found sufficient for the evening's fumigation.

The pleasing and immediate effect of the fumigation, in destroying the offensive and disagreeable smell arising from so many sick crowded together, was now very perceptible, even to the nurses and attendants. The consequence of which was, that they now began to place some degree of confidence in its efficacy, and approached the cradles of the infected with less dread of being attacked with the disorder; so that the sick were better attended, and the duty of the hospital was more regularly and more cheerfully performed. In short, a pleasing gleam of hope seemed now to cast its cheering influence over that general despondency, which was before evidently pictured in every countenance, from the dread and horror each individual naturally entertained of being, perhaps, the next victim to the malignant powers of a virulent contagion.

On the twenty-eighth, the fumigation was repeated morning and evening, in the same manner as on the preceding day, and with the same pleasing effect, destroying the offensive smell, and purifying the general air of the hospital. But there was, in particular places, a constant source of bad smell, which was not easily overcome, and which was occasioned by the *necessaries*. These were badly constructed, being placed within the ship, to the number of seven on the lower deck, and two on the middle deck, with small funnels that pierced the sides of the ship in a slanting direction, and generally retained the *soil*, unless where a person constantly attended to wash it away, a very troublesome and dangerous office, which chiefly fell to the lot of the nurses, and doubtless tended to spread the contagion amongst them.

I mentioned this nuisance to the commanding officer, who told me that he viewed them in the same light, and that some alterations were making, which he hoped would remedy the evil. I therefore waited a few days the event of these alterations, before I should make any publick report on the subject.

For the following eight days I continued the fumigation on board the Union, regularly morning and evening, as already described, without observing any particular occurrence different from what is already related, only that during this time, a considerable number of patients having been discharged from the hospital, all the spare cradles were ordered on deck, to be scrubbed and washed with the diluted marine acid, according to the particular directions of Dr. Smyth.

On the seventh of December, I resigned to Mr. Bassan the further prosecution of the experiment on board the Union hospital ship; but before I leave her, I must say, that it has already produced the most evident and beneficial effects, as not one of the attendants on the sick, nor any of the ship's company have been attacked with the disorder since I began the fumigation, with the exception of one nurse, who suffered a slight relapse from some imprudence, an accident which Mr. Bassan informs me was very frequent in the beginning. And as none of the sick, who have been brought to the hospital since my arrival, have died, it would seem that the fumigation has not only lessened the danger of infection, but also the malignity of the disease.

The process of fumigating as already described, with the *nitrous acid*, is simple and easy, and although the vapour is extremely powerful and penetrating, the sick of every description were observed to bear it, with little or no apparent inconvenience, and to a much higher degree than I could have expected; and as it is found to purify

the air from the disagreeable effluvia, produced by so many people crowded together in a confined situation, it will be peculiarly advantageous on board of sickly ships, where the crew, their clothes, and the ship, may be fumigated at the same time without any risk from fire.

December 16, 1795.

On the sixteenth of December, I again visited the Union hospital ship, and found that the fumigation had been hitherto carried on regularly twice a day, and with the same evident advantages, in purifying the air of the hospital, and lessening the malignity of the disorder; so that every nurse and attendant on the sick went now cheerfully and confidently about their duty, without the least dread or apprehension of the contagion, by which means the sick were better taken care of, and the general state of the hospital was in a much more prosperous way. It was therefore, from this time, deemed sufficient to fumigate only once a day.

December 23, 1795.

On visiting the Union again on the twenty-third of December, I found the carpenters employed from the dock yard, in making the alterations which I formerly proposed in a letter to Dr. Carmichael Smyth respecting the *necessaries*, and which I was happy to find, the Lords of the Admiralty had ordered to be done upon his application.

My proposal was to remove all the *necessaries* from the inside, and have them rebuilt on the outside of the ship, and by cutting down the lower edge of the same number of port-holes, to form entrances into them from the hospital, by which they would be equally easy of access to the sick, and the nuisance would be totally removed. This I was happy to find the carpenters were now executing, and I am confident it will be attended with

beneficial effects, by rendering the hospital much sweeter, and consequently more agreeable and healthy, both to the sick and attendants.

ARCHIBALD MENZIES.

Mr. Menzies, as is already mentioned in his Journal, having on the 7th of December, resigned to Mr. Bassan, surgeon of the Union, the management of the experiment, I must refer your Lordship, for the further detail of this business, to extracts taken from his letters, some of which you have already seen, and which are now arranged according to the order of time in which they were written.

Mr. Bassan's conduct, my Lord, through the whole of this business, does him the highest honour, and cannot fail to recommend him to your Lordship's notice. When the contagion at first began to spread among the ship's company of the Union, he was importuned, by the warrant officers and others, to send them on shore to sick quarters, which he peremptorily refused, saying, with the true spirit of a British sailor: "It is better we should all perish, than have such a contagious fever as this disseminated in our fleet." He accordingly made application to the Commander in Chief, and not a man was sent out of the ship. His humanity and care of the sick, Mr. Menzies mentions in the warmest terms of praise, and his successful treatment of them is the best testimony of his professional abilities. His zeal and attention, in conducting the experiment, I shall always recollect with gratitude. He and Mr. Menzies were both of them strangers to me until this occasion brought us acquainted; but I must say, that in the whole circle of my acquaintance, I could not have found two more liberal or candid men.

Extracts of Mr. Bassan's Letters to Dr. Carmichael Smyth.

Sheerness, December 4.

I beg leave to inform you that we have continued to fumigate, in the manner directed, daily; and as only one Russian has died since we began, I consider that circumstance as an early prospect of our future success.

— *December 7.**

The fumigation is not attended with the smallest inconvenience to any one, the majority of patients being in bed when it is done, and all of them in the wards; the cabins of the nurses, privies, &c. are fumigated, as well as the apartments of the marines and ship's company. For two months prior to the experiment, very few days elapsed without some of the attendants, or ship's company being seized with the fever; but since the 26th ultimo, the day on which Mr. Menzies began the fumigation, not one has been attacked with the disease: one nurse only having relapsed, a circumstance very common, and occasioned by her not taking care of herself. I beg leave to inform you, that this day I began to take charge of the business, in the absence of Mr. Menzies, who is on board the *Pamet Eustaphia* to try the experiment (she having been the most sickly ship) where I am certain he will take such measures as will do himself credit, and you honour.

I intend, in a few days, sending you a journal from the 1st to the 26th of November, the day

* This letter, which by some accident was mislaid, and consequently not inserted in the former edition, I have published in the present, as it renders his correspondence complete, and shows the unremitting attention of that worthy man, whose services the public have now unhappily lost, to every part of his duty.

Mr. Menzies began in the Union, and another from the 26th ult. to the 11th inst. containing the receipts, discharges and deaths, by which you will be enabled to make a fair comparison, much in favour of the means used, I am sure. The dejection and melancholy occasioned by the dread of the disease prior to the commencement of the experiment, was evident in every countenance, and really affecting, and distressing; but the circumstance of its being stopped at present, has diffused joy and cheerfulness, and all look forward with the hopes and expectation of soon becoming a wholesome ship. The symptoms of the fever are certainly much less violent, and at present, I have very few people in a dangerous state.

— December 9.

We continue to fumigate the ship as formerly; your other instructions shall be punctually adhered to.

— December 11.

I yesterday sent you two lists or journals, one of the Russian sick, and the other of persons belonging to the Union, who have been attacked with the fever; from the last you will perceive that very few days elapsed from the first importation of the disease, to the 26th ult. without some one or other of the attendants, or ship's company being seized with it; but since that period not one has been taken ill. I intend, very shortly, to send you a brief account of the disease, the symptoms of which are at present much meliorated. I believe that the fumigation has been of great service to the sick. We have very few patients at present who are not in a convalescent state, and there is every prospect that, through your assistance, we shall soon become a wholesome ship.

— *December 15.*

Since my last of the 11th inst. I have received eighteen patients with the fever, none of which have died, although some of them were brought to the hospital in a state of the utmost danger. The utility of the fumigation appears now very evident, as, notwithstanding the great number of fever patients brought into this hospital ship, not one of the attendants, or ship's company, have experienced the slightest indisposition since we first began to employ it: a very satisfactory demonstration of its power in destroying contagion. Indeed, Sir, I most sincerely congratulate you on the success of a discovery, which promises to be of such eminent service to society. Believe me, every thing shall be done, on my part, agreeably to your directions, to give it its full effect.

— *December 19.*

The fumigation continues to demonstrate its efficacy, as all the attendants, and ship's company, continue to enjoy perfect health, notwithstanding I have lately received some patients with the contagious fever in as bad a state as any I have seen; nor has a new nurse, or any of the workmen, who are daily employed in the hospital making the proposed alteration of the necessaries, suffered the slightest attack of the disease.—Mr. Menzies goes on with the Russian ships, from which I hope soon to find the infection totally extinguished.

— *December 21.*

I am happy to inform you, that the contagion on board this ship appears to be nearly at an end, no one either of the attendants on the sick, or of the ship's company, having been attacked with the fever since we began to fumigate, notwithstanding we have received some patients in as bad a state

of fever, since that time, as any from the first importation of the disease. The people bear it exceedingly well, and I frequently stand in the midst of a cloud, arising from the fumigation, as thick as a fog, without the smallest inconvenience, a circumstance of great consequence, as the sick are all in the wards during the fumigation, and their clothes, &c. are consequently impregnated with the acid vapour. In a few days we shall be able to ascertain the success on board the *Pamet Eustaphia*, the only ship at this port in which the fever at present seems to prevail to any degree. I shall then consider the experiment as complete, and shall congratulate you on the success of an invention, that in all probability, will give you immortal honour, which, from its public utility, you will so highly merit.

— December 30. *

Since my last, one nurse and one marine have been taken ill of the fever, although the symptoms are evidently milder than heretofore. As it is impossible to say how long contagion may remain in an infected person before it is put into action, I am not at all discouraged by these two cases; but shall continue every exertion in my power, in prosecuting the experiment which has already been of such eminent utility. I have received several patients from the *St. Alexander Niewski*, and another Russian ship, returned from sea, five or six of them ill of the fever. I need hardly observe, that if you could by any means enforce the fumigating all the Russian ships, as well as enjoin cleanliness, it would be of the utmost consequence; and if you can send any person to aid me in the business, I should be very glad; for though Mr. Menzies so strongly recommended to the Commanders the necessity of continuing the fumigation, not one at Sheerness has made application to me for any materials for this purpose.

Extract of a Letter from Mr. Bassan to Mr. Menzies.

Sheerness, December 30.

The Russian ships which arrived this week from sea, are sickly. I received several with the petechial fever, as bad as any I have seen; and am sorry to say that nurse Murray has had a slight attack, and one of the marines is at present ill of the same fever. He was taken ill on Tuesday morning; the symptoms are not so violent as formerly, and I shall double my attention in prosecuting the experiment which has already been of so much use.

TO DR. CARMICHAEL SMYTH.

Sheerness, January 4.

I cannot account for the contagion having produced the effects on the people mentioned in my last, otherwise than from the fumigation having been used the preceding week only once a day, or from their having been infected prior to the commencement of it, which I think is not impossible. I am now determined to use it constantly twice a day, and have done so since Tuesday last, the day on which the marine was attacked; besides, exclusive of the general fumigation, I place a fumigating pot or two in the wards near the worst of the fever patients. The sick not only bear the fumigation exceedingly well, but aid us voluntarily every day, the convalescents carrying the pipkins about, and expressing their conviction of its keeping the wards sweet, which certainly it does, and those persons who have hitherto escaped infection, are so much convinced of its efficacy,

and have so much faith in its power, that I should find it difficult to discontinue the use of it, whilst there is a sick man on board. As a week has now elapsed since any person has been attacked with the disease, notwithstanding we daily receive patients in the same putrid petechial fever, from the ships lately arrived from sea, I have every reason to expect our being once more a wholesome ship. Be assured, Sir, that no pains shall be spared on my part, to accomplish so desirable an object.

— January 7.

I am happy to inform you that no person has been attacked with the putrid fever since my last, though we have received several sick from the Russian ships lately arrived from sea.

— January 13.

I am happy to acquaint you, that since we began again to fumigate the ship twice a day, no one has been attacked with the fever, although there are several carpenters at work in altering the necessaries, which are nearly completed on the lower gun deck, and are to be altered immediately on the other deck.

I saw Captain Senevin, commander of the *Pa-met Eustaphia*, the day before yesterday, who informed me that he had continued the fumigation every day since Mr. Menzies's departure, and that he had now no sick on board.

— February 3.

I have the pleasure to inform you, that the contagion seems now to be totally extinct, no one having been attacked with the fever since the 26th of December last, and only two since the 26th of November, the time when the fumigation was begun; one of these a marine, who, ten days previous to his being taken ill, had constantly drunk very hard, and was often drunk; the other a nurse,

who was very slightly attacked, and both, in my opinion, might have received the infection long before it was put into action, as from their duty they were constantly exposed to the contagion when it was first brought into the ship; and this is rendered still more probable as there have been several artificers at work, making the alteration in the privies, and of course amongst the sick, and likewise a fresh nurse, a young woman immediately employed in the fever ward, none of whom have received the smallest injury. I therefore now consider the experiment as complete, and can bring sufficient evidence to convince any one that the contagion in the hospital, on board the Union, has, through Divine providence, been destroyed by the fumigation you recommended: besides, as the acid vapour keeps the ship sweet, it is my intention to continue it for that purpose constantly, if I am permitted so to do. The sick bear it perfectly well, and, from its power in destroying alkaline vapour, it renders the air pure, and consequently grateful both to the sick and convalescents, as well as to those whose duty it is to attend them. I most sincerely congratulate you on the success of this business,

And am,

Sir, &c.

A. BASSAN.

To the preceding account of the experiment on board the Union, I shall take the liberty, my Lord, to subjoin a brief description of the trials made at the request of the Russian admiral, and with the approbation of your Lordship, on board some ships of that squadron: and here I must again refer you to Mr. Menzies's journal.

REPORT OF THE EXPERIMENT,
FOR
STOPPING THE PROGRESS OF CONTAGION,
AS EXECUTED ON BOARD
SOME OF THE RUSSIAN MEN OF WAR,
BY
MR. ARCH. MENZIES,

SOON after my arrival at Sheerness, I had the honour of being introduced to his Excellency Admiral Hannikow, Commander of the Russian squadron at that port, on which occasion he was pleased to express a particular desire of having the most sickly ships of his squadron purified by the same process of fumigation, as I was then carrying on, on board the Union hospital ship. This being made known to the Lords Commissioners of the Admiralty, they were pleased to declare their approbation, by requesting Admiral Buckner to confer with his Excellency on this subject: and on the twenty-eighth of November, it was agreed between these Commanders that the fumigation should be tried, under my directions, on board such of the Russian vessels as were then most infected with the contagious fever, which had already proved so fatal to many of their crews; and it is but justice to say, that his Excellency, on this occasion, showed a particular zeal for its success, by offering me every aid and assistance, and by assuring me of a ready compliance with every means that might be suggested to accomplish so desirable an object, as the health and preservation of those under his command. But it so happened,

that, on the day following, he was ordered, with part of his squadron, to the North Seas, and in this state of hurry, not having time to consider which was the most sickly vessel, he left orders for the trial to be made on board the Revel frigate; but on examining the hospital books on board the Union, the Pamet Eustaphia, of 74 guns, appeared to claim our first attention, from her sickly state: I therefore waited on Admiral Buckner, to acquaint him with this circumstance, and he very readily applied to Capt. Chechagoff, on whom the command of the remaining part of the Russian squadron had devolved, and obtained his leave for the trial to be made on board of her, in preference to the other. After this, some unavoidable delay was occasioned, in waiting for the materials, and collecting together the utensils necessary for the operation.

In the forenoon of the seventh of December, 1795, I went on board the Pamet Eustaphia, and having ordered the ports, scuttles and hatchways to be close shut up, with the ship's company between decks, we fumigated her for the first time, and continued it morning and evening on the following day, in the same manner that we had done the Union hospital ship.

This ship has of late sent more sick with the malignant fever to the hospital, than all the rest taken together, of the Russian squadron lying at this port, which her Commander, Capt. Sinavin, attributes in a great measure to her shingle ballast being chiefly composed of sand, intermixed with a large portion of wet earth, that keeps up a constant moisture and dampness below, in spite of every means of ventilation: add to this the putrid stench arising in so close and crowded a situation from the *shubs* or sheep-skin great-coats, which are generally worn by the Russian seamen, with the woolly side next their body, and which undoubtedly must aid to nourish the seeds of contagion, and increase its virulence.

I represented to several of the Commanders of the Russian men of war, the necessity there was of destroying, or at least of suppressing these *shubs* in this country, for though they might be very comfortable, and answer pretty well in dry, cold, frosty weather, such as is generally the case in long winters in Russia, yet they were by no means calculated for the chilly wet weather which generally prevailed in this country; as in a damp state they never fail to impregnate the air with offensive putrid effluvia, that must be extremely hurtful to people's constitution where it is constantly breathed by so many crowded together in such a confined situation.

Early on the morning of the ninth, the *Pamet Eustaphia*, with the *Ratvezan* of 66 guns, were removed up to Chatham, in consequence of which it was not in my power to continue the fumigation, though I went there on purpose. And on the following day, the crew was so busily occupied, in unrigging the ship, and clearing her of stores and provision, to prepare her for going into dock, that no time could be spared to attend to the fumigation, until that duty was accomplished; which, as it would take up some days, and as her people were then to be put on board a receiving ship, while she was in dock, (a circumstance I considered as very unfavourable to the experiment) I therefore came to London on the eleventh to consult with Doctor Carmichael Smyth, what plan was best to pursue; for as this was the only Russian vessel from which a fair estimate could be drawn of the utility and efficacy of the fumigation, I was anxious to continue it, in whatever manner might be thought most likely to secure success in destroying the contagion, or lessening its malignity.

I returned to Chatham again on the fourteenth, with orders to fumigate as many of the Russian vessels, especially such as were most sickly, as I

possibly could; for though the experiment could not be regularly carried on, yet in this manner it might lessen the virulence of the disorder, and diminish the number of sick sent to the hospital.

Next day I waited on Captain Chechagoff, and Capt. Sinavin, and found that their vessels were not yet cleared of their stores, &c. so that I could not go on with either. Indeed, the *Ratvezan* was pretty healthy, her Commander, Capt. Chechagoff, being very attentive to every means of purifying his vessel by ventilation and cleanliness, and by destroying and suppressing the *shubs*, as far as he possibly could; for he told me, he could not do them away altogether, without giving the men other clothing *in lieu*, which must be done by an order from the Commander in Chief.

Captain Chechagoff also informed me, that the *Pimen*, of 66 guns, was arrived at Sheerness, which had some time ago been so very sickly, that boats from other vessels were forbid coming along-side of her, from a dread of the infection; he therefore expressed his desire of having her well fumigated; and I immediately set out to execute his request.

On the sixteenth, of December, I fumigated the *Pimen* for the first time. Her crew, however, was nowise sickly, now, although on visiting her between decks, before the fumigation, the stench produced by the *shubs* was very perceptible, and extremely offensive; and it was pleasing to observe the sudden change produced by the powers of the nitrous vapour in destroying it.

When I went on board, on the following day, to continue the fumigation, I found the officers and crew attending Divine Service and the Priests sprinkling the decks with Holy-water, so I did not intrude; but left orders with their own surgeon, to fumigate the ship in the evening, if he could conveniently, which he did. As this was a holiday, amongst them, I also declined calling on board the *Revel* frigate till the next day, when, after fumigating the

Pimen, I went on board the *Revel*, to request them to prepare for fumigating her. On visiting this vessel between decks, I found the putrid stench from the *shubs* extremely offensive and disagreeable from the confined air, and want of ventilation; and I had great difficulty to make myself understood, or give any particular directions for want of an interpreter.

The nineteenth was so boisterous that I could not get on board either vessel, but the Surgeon of the Pimen was so good as to continue the fumigation as usual. Captain Colokolsoff, the Commander of this vessel, was extremely civil, and well disposed to promote my endeavours; and the principal officers were equally polite and ready to see my directions executed on all occasions.

Next day I visited the Pimen, which was now quite free from stench or any offensive smell, in consequence of the fumigation having been regularly continued. I also began to fumigate the *Revel* frigate, and regularly attended both vessels, for the three following days; after which, I left the materials and utensils on board them, with directions to their own Surgeons to continue it in the same way daily.

From what information I could collect, the *Revel* had not been very sickly, yet the few she had lately sent to the hospital, were malignant fevers, which clearly showed that the contagion was lurking on board her, though it did not spread with much violence.

Being particularly anxious to resume the experiment on board the *Pamet Eustaphia*, she being the most sickly, and on that account claiming more particular attention, I came up to Chatham on the twenty-fourth, and found she had been just hauled into dock, and her crew put on board the *Prince Edward* receiving ship, where they were very much crowded. On the following day I began the fumigation; but as many of the ports and hatch-

ways of the ship could not be shut close enough to retain the vapour for a sufficient length of time, a quick and strong fumigation became more essentially necessary; which, however, I could not get them to execute, not being able to make them understand my meaning, for want of a sufficient knowledge of their language.

The fumigation was, notwithstanding, continued regularly on board this ship for the four following days, although it was not in my power to prevail on them to do it sufficiently strong, to do justice to the trial,—and to ensure that success we had already experienced on board the Union; their excuse generally was, that the fire was too much occupied to get a sufficient quantity of sand heated.

But, as it was possible, that even this slight fumigation might succeed by long continuance, and as their own Surgeon was now acquainted with the process, and well disposed to carry it on, I left the materials and utensils on board; and, before my departure, waited on Captain Sinavin, who, at this time, lived on shore, and who (after being acquainted with the foregoing circumstances) said that he should order it to be continued while his ship's company were anywise sickly.

The Ratvezan having likewise gone into dock; to prevent her crew becoming sickly on board the receiving ship, I, at Captain Chechagoff's particular request, sent utensils and materials on board to fumigate daily.

Having now put these Russian vessels in a fair train for continuing the fumigation; and finding that my presence, on account of my ignorance of their language, could not be of any further service; at the same time, some urgent business, of our late voyage, pressing hard upon me, I returned to town on the thirtieth of December, leaving the further prosecution of the experiment, as above related, to be conducted by their own Surgeons; and I have the most pleasing hopes that it will be attended

*with beneficial effects to her Imperial Majesty's subjects, not only in the present instance, but in every similar situation hereafter.

ARCHIBALD MENZIES.

Having now, my Lord, finished with the account of the experiment given by the two gentlemen who have been employed in conducting it, permit me, before concluding the subject, to call for a moment your Lordship's attention to some of the principal circumstances, and to the conclusions which they afford.

In the first place, my Lord, it must be allowed that the present experiment fully justifies all I have said respecting the safety with which the nitrous acid (procured in the manner described) may be employed as a fumigation. No one surely can say that I assume too much, when I consider the safety of the fumigation as established, after a trial of nearly three months, for an hour and a half or two hours, morning and evening, each day, on board an hospital ship, containing from two to three hundred persons of different sexes and ages, and labouring under different diseases; without a single instance of permanent inconvenience or bad consequence arising from it: for the slight cough, which it at first excited, and which was evidently owing to the awkwardness and ignorance of those who carried the fumigating pipkins, cannot be looked upon as such, and no farther inconvenience has ever been felt by any one on board.

Having established then this important fact, that the nitrous acid is attended with no risk to the health or safety of the people exposed to it, let me next claim your Lordship's attention to the sensible and immediate effects of it.

We are told by Mr. Menzies, that after the first fumigation, and still more remarkably after the second, the air of the hospital was perceived to be purer, and free from any putrid or offensive smell; these immediate effects of the fumigation, are likewise repeatedly mentioned by Mr. Bassan, the last of them indeed was too striking not to be taken notice of by every person on board. That the vapour of the nitrous acid should be found to destroy an offensive smell, the effect of animal exhalations, I was not surprised at, having myself had repeated experience of the fact; but that it would also render the air purer and more proper for respiration, I was by no means certain, until I found the repeated observations of those Gentlemen confirmed by the evidence of Mr. Keir, of Birmingham, one of the first chemists in this country, or perhaps in Europe; an extract of a letter from this gentleman, whom I have not the honour to know personally, to a friend of his in town, I have subjoined for your Lordship's satisfaction, as it affords a convincing proof, from chemistry, of the truth of what Mr. Menzies and Mr. Bassan observed in practice. These two qualities, my Lord, viz. the rendering the atmospheric air purer, and consequently fitter for the purposes of animal life, and the completely destroying the offensive smell resulting from animal effluvia or putrid matter, are of themselves, considerable advantages, if no others were to be expected or derived from the fumigation; but they are of still higher importance, when considered as presumptive evidence of the power of the nitrous vapour to destroy contagion; for whatever is found to destroy the smell of putridity, and at the same time to render the air purer, we must suppose more or less conducive to this grand object. But presumptive evidence, on a subject of this importance, in which the lives of thousands are involved, is not sufficient to satisfy the mind; and happily for mankind, the present experiment, instituted under your

Lordship's auspices, affords complete and direct evidence of the fact.

But to bring this home to the understanding and conviction of all mankind, it is only necessary to look with attention at the annexed Hospital Return; for by comparing the state of health of the ship's company, with the progress and effects of the contagion, before and after the experiment was begun, a clear and decided judgment may be formed of its effects, even by the most ignorant. They will in the first place observe, that from the 3d of September (the day the Russians, ill of the fever, were first brought on board) to the first of October, there were nine persons seized with the distemper, one of whom only belonged to the ship's company; the others were attendants on the sick. That in the month of October, eight persons more were attacked with the disease, and of those, three belonged to the ship's company. But, that from the first of November, to the 26th of that month, twelve persons were attacked with the disease, among whom we find eight belonging to the ship's company. From this short statement it is evident, that the contagion which was at first chiefly confined to the hospital, affecting those only who were immediately employed about the sick, had gradually spread over the ship, and been communicated to the ship's company; by which means the sickness and mortality had increased: and the probability is, that had not a stop been put to it, it would have gone on increasing in proportion to the diffusion of the contagion, and to the increasing despondency of the people, who considered themselves as so many devoted victims. The whole number of persons seized with the distemper, during the first three months that it prevailed on board the ship, was thirty (besides six children) which was more than one third of all the people in the ship, who were only eighty-five, officers included. Of the thirty seized with the fever, eight died of the im-

mediate effects of it, a large proportion surely, being not much less than one in three, and which sufficiently marks the malignity of the distemper.

Having taken a view of the state of the ship's company, and of the progress of the contagion before the experiment, let us now, my Lord, turn to the other side of the picture, and see what was the situation of things after the fumigation was begun.

On the 26th of November, the ship was fumigated for the first time, and from that day to the 25th of December, not a person on board was attacked with the fever, their despondency was now changed into joy, and their fear into confidence; but as very great confidence is always dangerous, it proved so in the present instance. On the 17th of December, they imagined themselves so secure, that they discontinued the custom of fumigating the ship morning and evening, thinking that once a day was sufficient; the trial, perhaps, was worth hazarding, but on the 25th of December, one of the nurses suffered a slight attack, and on the 26th, a marine, who for a week preceding had been in a state of intoxication, was seized with the fever, of which he died. These two accidents gave immediate alarm; they returned again to the practice of fumigating twice a day, and from that time to the end of the disorder, there has not been an instance of a person suffering from contagion on board the ship. But the advantage of the fumigation was not felt by the ship's company and attendants alone, whom it preserved from the baneful effects of the fever, the sick and convalescents derived almost an equal benefit from it. The symptoms of the disease (as Mr. Bassan expresses it) were meliorated, and lost much of their malignant appearance, and the advantage of a pure air, and free from stench, to convalescents, may readily be conceived.

From the above relation, my Lord, it plainly appears, that whilst the practice of fumigating

the ship twice in the twenty-four hours was continued, there was no symptom of contagion or of disease, and that the only two accidents which happened from the commencement of the experiment, to the present hour, occurred on the 25th and 26th of December, nine or ten days after they had ceased to fumigate the ship, in the manner I had directed. The attack of the nurse, indeed, was but trifling, and I think it not improbable that the fever, as well as the death of the marine, were the consequence of his own intemperance; at any rate, supposing both the one and the other to have suffered from contagion, these cases do not in the least invalidate the general success of the experiment, and only prove, that in a situation where contagion is constantly generated, it requires to be as constantly destroyed; otherwise it is ready at every instant, like the hydra, to rear again its pestilential head.

But, my Lord, the success of the experiment has not been confined to the Union, the power of the nitrous vapour to destroy contagion, has been equally displayed on board those Russian vessels where it has been employed.

Your Lordship must have observed, in Mr. Menzies's Journal, the many unexpected delays he met with in the execution of this business. The sudden departure of the Russian Admiral, with a considerable part of the fleet, before the ships, the most proper for the experiment, were fixed upon; Mr. Menzies beginning, in consequence of not being properly informed, with ships where the fumigation was not so immediately necessary; afterwards, when he began to fumigate the *Pamet Eustaphia*, which had sent more sick to the hospital than any ship of the fleet, she was immediately ordered into dock, and the crew turned over into a receiving ship, a situation extremely disadvantageous for such an experiment: not to

mention the various difficulties and obstacles arising from the difference of language, usages, religious ceremonies, &c. sufficient to have discouraged a man of a less firm mind, or who was less zealous than Mr. Menzies in pursuing his object. He persevered, however, for some time, but at last was under the necessity of returning to town, and of leaving the farther prosecution of this business to the Russians themselves; and yet, my Lord, owing to the good sense and proper conduct of their officers, who, convinced of the advantage of the fumigation, continued the daily practice of it; those ships that have been fumigated, are free from contagion, and particularly the Pamet Eustaphia which was the most sickly, is now one of the healthiest of the fleet, and has no appearance of contagion on board, nor a man ill of the fever; and so great is the opinion entertained by Admiral Hannicoff, of the efficacy of the fumigation, that he lately sent to town for materials for fumigating some more ships.

Such, my Lord, has been the result of an experiment, by which some lives have been already saved, and from which two important facts are clearly established, viz. the power of the nitrous acid to destroy contagion; and the safety with which it may be employed in any situation, without inconvenience or risk of fire.

It would be, perhaps, improper in me to detain your Lordship any longer on this subject, by endeavouring to point out the importance and extensive application of the present discovery; a discovery equally applicable to every species of putrid contagion, even to the plague itself; a discovery, therefore in which all nations are more or less interested, but the utility of which must be most sensibly felt by our own; where a commerce, extended to every quarter of the globe, covers the

sea with our ships, whilst our gallant navy still
maintains the decided empire of it.

Oh fortunatos nimium, sua si bona norint,
Britannos!

I have the honour to be,
My Lord,

With the highest respect,

Your Lordship's

Most obedient and obliged

Humble Servant,

JAMES CARMICHAEL SMYTH,

*Charlotte street,
Bloomsbury,
Mar. 12, 1796.*

Earl Spencer.

A Return of those Persons amongst the Attendants on the Hospital, or belonging to the Ship's Company of the Union, who were attacked with the Contagious Fever, from the 3d of September, 1795, when the Russian sick were first brought on board, to the 10th of February, 1796, the date of the last Report.

(Signed) A. BASSAN, Surgeon of the Ship.

Before the Ship was fumigated.

Names.	Quality.	When seized.	Recovered.	Dead.
S. Brown	Nurse	Sept. 6	_____	
H. Warren	_____	7	_____	
M. Mitchel	_____	9	_____	
M. Reed	_____	11	_____	
Mr. J. Gardner*	Ss. 1st Mate	15	_____	Sept. 24
M. Rawlins	Nurse	18	_____	
S. Hayes	_____	20	_____	
Tho. Mitchel	Helper	22	_____	
A. Clavering	Nurse	24	_____	Sept. 28
Tho. Lee	Marine	29	_____	Oct. 1
M. Sawyer	Washer-wo.	Oct. 6	_____	— 15
Mr. Messersmidt	Ss. 1st Mate	6	_____	
A. Bright	Nurse	8	_____	— 11
D. Sawyer	Ab.	8	_____	
H. Tuberville	Nurse	14	_____	
Mr. Bodker	Ss. 2d Mate	22	_____	
Cha. Walton	Ab.	22	_____	
James Potter	Marine	22	_____	
C. Taylor	Nurse	Nov. 2	_____	
S. Parker	Washer-wo.	4	_____	
Wm. Crasby	Marine	4	_____	
Wm. Welch	_____	10	_____	
Rd. Welch	Ab.	10	_____	
Henry Kelly	—	17	_____	
Peter Parker	—	17	_____	
Geo. Mantle	Marines	18	_____	
Tho. Reed	St Marines	18	_____	
Jos. Copeland	Ab.	20	_____	Dec. 4
Jas. Tuberville	Marine	20	_____	Nov. 24
M. Clay	Washer-wo.	24	_____	T. uncertain
Before the Experiment,		Total	30	22
				8

* He was discharged from the Union, and entered on board the Sandwich, the 12th of September; was taken ill a few days after, and died in about a week.

After the Ship was fumigated.

Names.	Quality.	When seized.	Recovered.	Dead.
Marg. Murray	Nurse	Dec. 25	{ In a few days.	Jan. 6.
James Farmer	Marine	— 26		

Since the Experiment, Total 2 1 1

N.B. On the 26th of November, the Ship was fumigated for the first time, and the fumigation repeated twice a day till the 17th of December; from that time to the 26th of December, only once; but from the 26th of December to the 10th of February, twice a day, as at first,

A Weekly Return of the Russians received on Board his Majesty's Hospital Ship Union, in the Malignant Fever, from the 3d of September, 1795, to the 28th of January, 1796, exclusive of those received in a State of Debility after the said Fever, and with other Diseases. By A. BASSAN, Surgeon of his Majesty's Ship Union.

Sept. 1795.	Received.	Discharged.	Dead.
Sept. 3	37		
— 10	37	1	
— 17	4	7	
— 24	34	7	1
Oct. 1	17	17	5
— 8	29	15	
— 15	20	5	2
— 22	15	14	1
— 29	18	11	1
Nov. 5	31	9	1
— 12	21	13	
— 19	20	44	5
* — 26	29	39	1
Dec. 3	12	5	1
— 10	12	16	1
— 17	35	48	
— 24	8	25	1
— 31	40	1	
1796.			
Jan. 7	32	25	3
— 14	13	7	2
— 21	20	24	3
— 28	22	23	6
Total	479	356	34

* This day the Ship was fumigated,

From the above return it appears, that the number of persons ill of the contagious fever, brought on board the Union, the two last months, December 1795, and January 1796, were nearly equal to the number received the two preceding months, October and November. It also appears that for the first month after the ship was fumigated, there were few fever patients who died. The increase in the number of deaths in the following month, may fairly be ascribed to the return of the fleet.

N. B. The greater part of the Russian squadron sailed on a cruize November 29, and returned into port December 27, two or three ships at a time,

APPENDIX.

*Extract of a Letter from Mr. Keir, of Birmingham,
to a Friend in Town.*

January 25, 1796.

I consider Dr. Carmichael Smyth's discovery to be very valuable. The fumes in his process are quite different from the ordinary nitrous vapour in the distillation of aqua fortis, or from that which exhales in the solution of metals, by nitrous acid; the latter is highly suffocating and noxious, and may be called the phlogisticated nitrous acid vapour. The fumes made in Dr. Smyth's manner (if there is no metal employed in the vessel, &c.) is highly dephlogisticated or oxygenated nitrous vapour, and is also mixed with a large quantity of pure dephlogisticated air, which is extricated from the materials; and these fumes are not only not suffocating, but have a very pleasant smell. If the distinction is not made between these two kinds of vapour, it is to be feared that some person, by accident, or in expectation of getting the nitrous vapour more expeditiously, may use metal vessels, or dissolve metals in nitrous acid.

*Extract of another Letter from Mr. Keir, dated near
Birmingham, March 3, 1796.*

The difference between the white nitrous acid, (called, by Dr. Priestley, dephlogisticated acid, and by the French chemists, acide nitrique,) and the red acid, called phlogisticated, or acide nitreux, is well known, and was first particularly noticed by Scheele, who shows how the one may be separated

from the other by distillation. There is the same difference in the colour of the vapours from these two acids; and Dr. C. Smyth has himself observed, that the vapours, in the distillation of nitrous acid, were not noxious; which observation he has very happily and usefully applied. In distilling the nitrous acid from very small quantities of nitre and oil of vitriol, in glass vessels, and when the materials are very pure, I have seen nothing but the white vapours, such as rise in Dr. C. Smyth's process; but Scheele says, that at the end of the operation, some red vapours rise, and it may be the case when a very strong heat is applied. But the very noxious red fumes which appear in the usual process of distilling aqua fortis, are occasioned, as you mention, by the iron vessels; and the manufacturers even put in old nails and small pieces of iron into their pots, in order to give a high degree of red smoking quality to the acid. When you acquainted me of Dr. C. Smyth's discovery, it occurred to me, that as the common notion of nitrous acid vapours is confined to those that are red, some people might, in the first place, be prejudiced against it, from the idea of the vapours being noxious; as the red vapours are undoubtedly: and others might think that they made the process more effectual, by adding to Dr. C. Smyth's mixture, metals, or inflammable substances, in order to produce those red vapours. I therefore thought it would be proper for Dr. C. Smyth, to point out the difference between the vapours produced in his method, and the red nitrous fumes which are so well known; and also to caution the operators to avoid metal vessels, or the addition of metals or inflammable substances.

There is a good deal of vital air extricated from the mixture; but I cannot agree with those who attribute the medicinal effect to it: we know little of this subject; but the analogy of the destruction of all animal and vegetable fermentation by mineral acids, which is well ascertained, inclines me to

believe the agency of the acid, in the destruction of the contagion; the matter of which is, I presume, animal, in some vitious kind of fermentation.

A Letter from Mr. Bassan, Surgeon of his Majesty's Ship Union, to Dr. Carmichael Smyth, under date, the 16th of February, 1796.

DEAR SIR,

We had an increased mortality amongst the Russians last month, but, thank God, not from the contagious fever, that being now totally extinct; But from some being brought in a dying state, others in the scurvy, the most deplorable cases I ever saw; added to which, several hectic patients, who had been declining some time, happened to die at that particular period. I hope we shall have no return of so dreadful a calamity.

I remain,

Sir,

Your most obedient Servant, &c.

(Signed)

A. BASSAN.

Extract of a Letter to Mr. Menzies, from Captain Chechagoff, Commanding Officer of the Russian Fleet, in the absence of his Excellency Admiral Hannicoff. Dated Chatham, March 9, 1796.

Agreeably to your wish, it is with the utmost pleasure that I expose the proofs of a truth so useful for the human kind, and so much to the honour of those that are the primitive cause of it, and those that put them in execution, with an efficacy, as is acknowledged in the certificate here joined. I beg to present my compliments to Dr. Smyth, for whom I have the respect that is owing to all those

who have assured their renommée*; by the good they have done to the public, and to get its suffrage.

I am, with much esteem, &c.

(Signed)

P. CHECHAGOFF.

CERTIFICATE.

" It has been observed that the fumigation, with the nitrous acid, introduced by Mr. Menzies on board the ship Pamet Eustaphia, has produced, in a short time, the best effect in stopping the progress of the fever and other evils, which were then evidently increasing; for which reason it was not only regularly continued on board of that ship, even after Mr. Menzies's departure, but adopted on board of others, and always found useful. It is therefore my duty to certify by this, not only the good consequences that have been observed from that useful contrivance, but even the advantage that arises from its easy and sure execution, in comparison with other means of fumigating the ships which require greater attention from the fire that must be made use of, and therefore cannot be effectuated in all the parts of the ship."

(Signed)

CHECHAGOFF,

Captain and Senior Officer of the Russian Fleet.

March 10, 1796.

* The public will recollect that Captain Chechagoff is a foreign officer, writing English, and therefore will not be surprised at his making use of one French expression.

COPY OF A LETTER

FROM

DAVID PATERSON, ESQ.

SURGEON IN HIS MAJESTY'S NAVY,

AND LATE

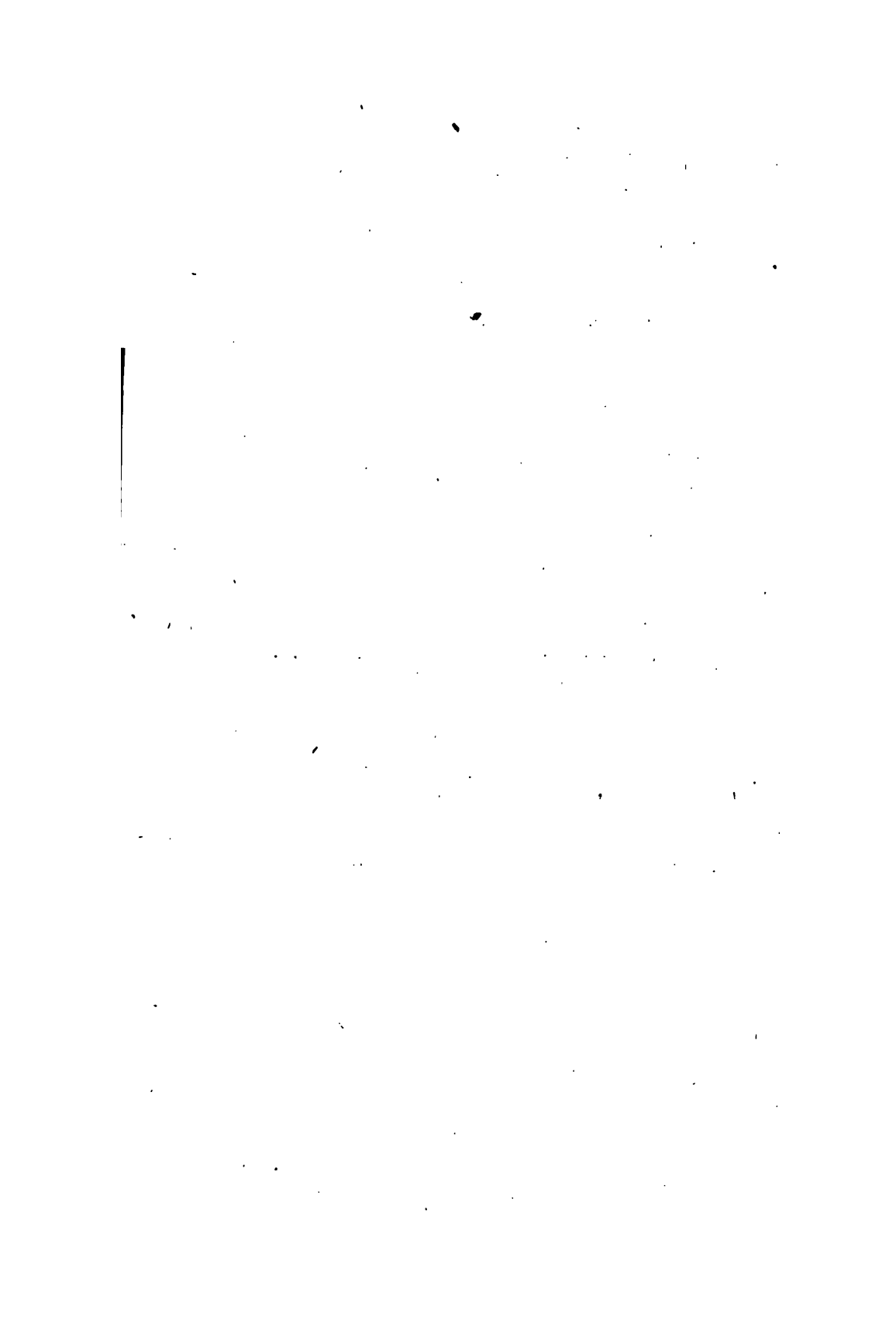
SURGEON TO THE PRISONERS OF WAR AT FORTON,

TO THE

COMMISSIONERS

FOR TAKING CARE OF SICK AND WOUNDED

SEAMEN.



COPY OF A LETTER,

&c.

GENTLEMEN,

LAST winter, while I had charge of Forton hospital, although in the midst of very fatiguing duty, and engaged, as I was, in making some favourite experiments of my own, yet, being extremely anxious to acquire some practical knowledge of Dr. J. C. Smyth's nitrous vapour, I failed not, after receiving your authority, to put his fumigating plan in execution, as extensively as it was possible; nor, at the same time, to note down the phenomena, as they occurred, with as much accuracy as my leisure time would permit. And now, in order that you may see, in the fairest points of view, some of the effects of the vapour resulting from that highly ingenious, and very salutary process; and, also, with the view no less of doing justice to Dr. J. C. Smyth, than of rendering his nitrous vapour more extensively useful, in the Navy, Army, &c. I beg leave to communicate to you the contents of the following pages; which, should they appear to you in any degree calculated to be serviceable, in promoting the welfare of these realms, I humbly request you will be pleased to lay them before the Right Honourable the Lords Commissioners of the Admiralty.

In pursuing my present plan, I shall, after giving you a short, but not imperfect account of the method I followed in fumigating the wards of the hospital, state, in a faithful manner, such facts, whether of a general, or of a particular nature, as arose from the trials that were made; after which, by most humbly offering a few observations connected with the subject, I shall conclude my letter.

Every evening a certain number of wards were fumigated, each by means of three pipkins, for an

hour; the gally-pot in each pipkin containing the quantities of pure nitre in powder, and concentrated vitriolic acid, as directed by Doctor Smyth*. Three persons, each carrying one fuming pipkin, went round a ward, following one another at some distance, and holding the pipkins under each bed, for a considerable time, as they went along; and they continued doing so as long as the fumigation lasted. The wards, by opening the windows and doors, were afterwards filled with atmospheric air.

The vapour, proceeding from the decomposition of the nitre, by means of the concentrated vitriolic acid, was in such great quantity, that a ward 57 feet by 20, and 10 feet 6 inches high, was filled with it, by means of three pipkins, in the manner I have mentioned, in the space of fifteen minutes.

On the wards being filled with nitrous vapour, some of the patients who laboured under affections of the lungs were seized with fits of coughing; none of them, however to any great degree. With little or no exception, the patients, in the wards that were fumigated, bore the vapour without feeling any disagreeable effect from it. If, indeed, a pipkin was, accidentally, held very close to the mouths of any of the patients, which, from awkwardness, was sometimes the case, coughing was immediately produced; and, in one instance, vomiting was occasioned. These circumstances, however, did not prevent the patients from becoming, in a short time, very fond of the fumigating business. For my part, I frequently remained in a ward during the whole time of the fumigation, often indeed with a fuming pipkin in my hand, without experiencing any disagreeable effect whatever. The fume was to me pleasant. When, during the fumigation, I re-

* For a more particular history of the process, vide Doctor J. C. Smyth's letter to the Right Hon. Earl Spencer, &c. &c. &c. containing an account of the experiment made on board the *Union* hospital ship, to determine the effect of the nitrous acid in *destroying* contagion, &c.

remained in a ward, I always wore black clothes, which, even, after being repeatedly exposed to the nitrous vapour, were not in the least either stained, or changed from black to a brown colour.

In the mornings, particularly in dry weather, the wards that had been fumigated the preceding evening, even although they had been washed early in the morning, and the windows kept open, had a very agreeable smell, much more pleasant than that which was experienced during the fumigation. By this agreeable odour, in the mornings, I was able to judge whether or not due pains had been bestowed, the preceding evening, in fumigating the wards.

One dysentery ward, one fever ward, and one surgery ward, containing the worst kind of ulcers, were, at first, the places filled every evening with the nitrous vapour; but, as the good effects resulting from the fumigation were to me very obvious, I soon used it more extensively. The patients, in general, who laboured under old dysenteries, many of them contracted in the West Indies, seemed to be greatly relieved*; the fevers, which were of no uncommon genus, and which were in their nature very mild, soon disappeared, without exhibiting any symptoms of typhus; and the ulcers, instead of further degenerating or spreading, put on a favourable appearance, and healed.

It is, I presume, of no small consequence to observe, that, excepting some marked cases of dysentery, among the servants of the prison and hospital, in the months of August and September, before the arrival of the prisoners from the West Indies, and one case of typhus (in ward 18) with now and then a case of small-pox, among the West Indians, after their arrival, there was not any contagious febrile disorder that made its

* Ultimately, a great number of the old dysenteries, where the patients were not far advanced in life, did well.

appearance within the walls of the hospital, while I had charge of it, notwithstanding the many sources of contagion to which, in my opinion, all in and about it were exposed. During the last five months of my time, no fewer than 1686 patients were admitted into the hospital, as may be seen by the hospital books.

The following table serves to show, at one view, the highest number of patients in the hospital, the number discharged and dead, weekly, for four weeks before, and six weeks after the nitrous vapour was first used; viz. from the 16th of October, to the 26th of December, 1796. To include a greater space of time would be improper; because, before the 16th of October, there were but few patients in the hospital; and, because, after the 26th of December, there were a great number of extremely bad cases of gangrenous feet, pneumonia, &c. received into it, from Portchester hospital, and from the Vigilant and Captivity prison ships:—

TABLE.

Before the Nitrous Vapour was used.				After the Nitrous Vapour was used.			
Weeks.	Highest Number in the Hospital.	Number discharged.	Number dead.	Weeks.	Highest Number in the Hospital.	Number discharged.	Number dead.
1	223	2	8	1	340	27	6
2	372	4	21	2	332	7	5
3	371	0	13	3	342	11	8
4	369	1		4	340	8	4
			9	5	486	12	1
				6	539	63	5
		7	51			128	29

After these general observations on the nitrous vapour, I shall humbly beg leave to offer the following cases, in which it was, undoubtedly, used with very remarkable success.

CASE I.—Jean Louis, French prisoner, of colour, eighteen years of age, from the West Indies, was admitted into the hospital on the 28th of October 1796, for an ill-conditioned ulcer on the inferior and interior part of the right leg. After he had been some time in the hospital, the ulcer began to put on a favourable appearance, and was soon considerably diminished in its size, merely by means of simple dressings.

On the 29th of November, however, the ulcer, according to the common phrase, became foul; and by next day, it had spread to such a degree, that it was nearly as extensive again as it ever had been, attended with very acute pain, and with a very copious thin dark-coloured fetid discharge. The patient's pulse, at this time, was 120, tongue clean; appetite impaired, belly open; sleep much disturbed.

31st. From the 29th to this time, a common poultice, thrice a day, was the only application; but now, in addition to the poultice, the ulcer was dressed with the powder of Peruvian bark; a cooling medicine, with an opiate at bed-time, was ordered; and a vegetable diet with milk was enjoined.

2d December. The ulcer still more extensive than it was on the 31st ult. It now extended from the Tarsus six or seven inches upwards, and from the Tibia more than half round the leg: it was still in a sloughing state, with high reflected edges. The other symptoms much the same as before. Finding that the plan hitherto pursued had not produced any good effect, either on the ulcer or on the system, the whole of it, excepting the poultice, was abandoned, and the nitrous vapour adopted. The ward in general, and the bed of the

patient in particular, were carefully fumigated, the ward once, the bed twice a day,

3d. The ulcer had stopped spreading, and in some places looked clean. Such a sudden change was to me astonishing. Pulse now 110; tongue clean; belly open; slept better on the night of the 2d than for some time before, notwithstanding the omission of the opiate.

4th. The ulcer was clean, and discharged good matter. The patient felt himself comfortable. Pulse about 90.

6th. The discharge continued to be good; and the ulcer had made considerable progress in healing. The patient felt himself perfectly easy, and his health was already very much mended.

The fumigation was continued until the 26th of December, from which time, owing to a want of materials, it was discontinued until the 11th of January, 1797. The ulcer, during the time the fumigation was used, and even to the 1st of January, 1797, continued to heal kindly, and rapidly; but, at that period, it again became foul and sloughing, and was soon as extensive as before. The appetite was again impaired; pulse 120, and small; belly open; the patient much weakened and emaciated. Half a drachm of Peruvian bark, thrice a day, and eight ounces of wine in the twenty-four hours, were ordered; and the ulcer was dressed twice a day with the powder of Peruvian bark and common poultice. An opiate was occasionally allowed at bed time. This treatment was persevered in until the 11th, when, having experienced no good effects from it, it was discontinued, and recourse again had to the nitrous vapour, and common poultice, as on the 2d of December, 1796.

12th. The ulcer had stopped spreading, and in some places had begun to clean. The pulse was less frequent, and more full; and the patient was, in every respect, better, and more comfortable. The nitrous vapour, &c. were continued.

13th. The ulcer was perfectly clean, with florid granulations, and with about the eighth of an inch of new skin round the edges. The plan was continued.

20th. The ulcer looked very healthy, and was contracting rapidly. The plan was continued.

5th February. The ulcer had contracted more than one half. The plan was continued.

12th March. The ulcer was nearly healed, (not so much as the breadth of a sixpence being open) and looking healthy. On this day I finished my duty, and, consequently, my observations at Forton hospital.

I have here to observe, that about the 1st of January 1797, all the ulcers in the same ward (No 14) with the above, were more or less in a bad state; and that they all, about one and the same time, began to put on a favourable appearance; and also that, in a short while, many of them healed. Likewise, it is necessary to observe, that particular attention was paid all along to cleanliness and ventilation.

CASE II. La Granade, French prisoner, aged 26 years, from the West Indies, was admitted into the hospital on the 16th of December, 1796, for chilblains. In the end of February 1797, an ulcer broke out on his left leg, which became very foul and sloughing, and did not yield to common remedies. On the 7th of the following March, the nitrous vapour was used, exactly in the same manner as in the preceding case, and by the 12th the ulcer was perfectly clean.

CASE III.—Elie Double, French prisoner, aged 22 years, from the West Indies, was admitted into the hospital on the 28th of October 1796, for an ulcer on the anterior and middle part of his left leg. By the middle of February, 1797, the ulcer was cicatrised, but with a considerable protuberance remaining over that part of the tibia, as if the periosteum and even the bone itself had been in a dis-

ceased state. About the end of February the cicatrix became inflamed, soon suppurated, and degenerated into a foul sloughing ulcer, which, instead of yielding to any of the various applications, got worse and worse every day. From the end of February, (I cannot exactly tell the day,) cataplasms of different kinds, myrrh, and Peruvian bark, were tried externally; and wine, Peruvian bark, opium, &c. were administered internally. At the same time, great attention was bestowed in keeping the ward extremely clean, and thoroughly ventilated. Finding not only that no good effect was produced by any of these means, but even that the ulcer, the sound parts being still in a mouldering state, grew more and more extensive, I came to a determination, considering myself sufficiently authorised, from the experience I had had, to make trial, in this untoward case, of Dr. J. C. Smyth's nitrous vapour. Accordingly, on the 7th of March the fumigation was put in practice, in the same way as in the foregoing cases; and, it is with heart-felt pleasure I relate it, by the 12th, that was in five days time, and on the day I finished my duty at Forton, the ulcer was perfectly clean and healthy.

CASE IV.—François a negro French prisoner, age unknown, was admitted into the hospital on the 26th of January 1797, for a wounded little finger. On examining the wound, I found that the last bone and the surrounding ligaments were the parts most materially injured. The bone was fractured, and the soft parts were contused to a very great degree, with a small lacerated wound at the tip of the finger. Deeming it necessary, I immediately amputated the limb at the joint formed by the second and last phalanges. The stump, the bone being well covered, and the soft parts looking healthy, had all the appearance of doing well, during the first fortnight; but, unfortunately, at the expiration of that period, it began to put on a very unfavourable aspect. Instead of the diseased parts

being sinuotis, or having, what is perfectly understood in surgical language, a glassy appearance, which sometimes indicate a diseased bone, they became enlarged to a prodigious degree, reflecting very considerably, so as to resemble a ball on the end of the stump; and, at the same time, appeared foul, discharging a dark thin fetid matter. In this state, Peruvian bark, opium, &c. were tried, as also cataplasms, but to no purpose. In the end of February, recourse was had to the nitrous vapour; and, by means of it, in six days time, the ulcer was perfectly clean.

CASE V.—Bastern, a negro French prisoner, age unknown, was admitted into the hospital on the 28th of January 1797, for an ulcerated toe. This case was very similar to the finger of which I have just taken notice, and, like it, after various ineffectual applications, was cleaned, and put, seemingly, in a healthy state, by means of the nitrous vapour, used according to the manner I have already related. The four last cases were in the same ward, No. 4.

Having, with respect to Dr. J. Smyth's nitrous vapour, agreeably to my promise, finished the most important part of my experiments, with the phenomena resulting from them, in order to show you that this vapour, under proper management, is capable of producing very happy effects on the human frame, I shall now most humbly offer a few observations, which appear to me to be connected with the subject.

And, to proceed, I am in great hopes that the facts detailed in these pages, while they serve as so many proofs of the utility of Dr. J. C. Smyth's fumigating plan, will, at the same time, answer the happy purpose of not only removing the ill-grounded fear of Dr. Trotter, and of convincing him, as well as those who think as he does, that no danger is to be apprehended from the combination of azot with the nitrous vapour; but, also, of conquering the prejudices of those gentlemen who imagine (for

some highly respectable medical practitioners have lately mentioned to me their apprehensions) that this vapour, from its being loaded with vitriolic acid, must be intolerable to the lungs, and of course highly pernicious to persons subjected to its influence.

With regard to the bad, or deleterious effects of the nitrous vapour, I cannot say, from experience, that I am acquainted with any of them. The trials that I made of this vapour were on a great number of diseased persons, who, although crowded together within the walls of an extensive hospital, and from this circumstance, as well as others of at least equal moment, exposed to the influence of noxious effluvia, were obviously, in many instances, as already mentioned, benefited by its salutary effects. Many patients were cured; others were put into a fair way of being cured. And, I must add, for it is not, I presume, altogether improbable, that, by means of the nitrous vapour, with other no less important measures, which I adopted, and incessantly followed when in my power, the patients who were under my charge, in Forton hospital, were preserved from the attacks of contagious fever. I have ventured to say with other no less important measures, because I am well aware, as Dr. J. C. Smyth undoubtedly is, that, without the most strict attention to cleanliness, and to the circulation of pure or atmospheric air, neither the nitrous vapour, nor any thing administered with similar intentions, can prove so efficacious as we could wish, in preventing or putting a stop to contagious fever, as well as other diseases, though perhaps not so immediately, yet ultimately as fatal. I am here under the necessity of observing, having forgotten to do it in the proper place, that the solitary case of typhus, which, as before mentioned, was in ward eighteen, did not originate in the hospital, but in the Captivity prison ship. What the nature of the disorder had been primarily, I am at a loss to say. The patient died, and, fortunately, so did the dis-

ease; for I saw not another fever of a similar nature in the hospital.

As no contagious fever (I mean typhus, or what some authors have called jail fever, others hospital fever, &c.) prevailed, during my time, in Forton hospital, I cannot say positively that the nitrous vapour solely prevented such a fever from prevailing. All that I can say is only, that the circumstance of no contagious fever having prevailed in Forton hospital, during my time, may be considered as being of a very singular nature; more especially when we take into our view the vast number of patients, in the most filthy state, from the West Indies, &c. that were received. The very particular attention that was paid to the patients, on their being received, in stripping them of all their clothes, in bathing them, in shaving their heads, in burning all their clothes, and also in keeping the hospital, at all times, extremely clean, and thoroughly ventilated, may, it is probable, have contributed not a little towards preventing contagious fever. And, further, another circumstance which, perhaps, had operated very powerfully in assisting to obviate contagious fever, and which deserves to be very particularly remarked, was the changing of the wards as frequently as it was possible, and that according to the nature of the complaints they contained: for instance, and by comparison, wards that contained convalescents, and also those that contained slight or chronic diseases, were changed frequently; those that contained febrile diseases more frequently, and those that contained very bad surgical cases most frequently. By the changing of wards, I mean the removing of the patients from one that they had occupied for some time, to another that was perfectly purified.

When a ward of whatever description was changed, it was first emptied, by the patients being removed into another, and by its bedding being sent to be baked, fumigated, or washed; and then it

was without loss of time fumigated by means of sulphur; then white-washed; then its cradles cleaned, and washed with vinégar; then the floor of it thoroughly cleaned; and, lastly, its windows on the one side, and its scuttles on the other, were kept open, always when the weather would permit, until it was again occupied by patients, which, if the state of the hospital admitted, was not before eight days had expired. Such regulations as the above ought, in my humble opinion, to be constantly and very particularly observed, by all medical men who have the immediate charge of hospitals for prisoners of war; many of them, I presume, might, with propriety and utility, be observed in any hospital; and in concluding this subject, I beg leave humbly to suggest to you that no hospital ought to be full, but, on the contrary, that there should always be, in all, according to their different sizes, two, three, four, or more wards left empty, for the very salutary purpose of changing.

Cleanliness, ventilation, and changing of the wards, whether with the view of obviating or removing diseases, are, in all hospitals, as well as in all places where prisoners of war are confined, &c. absolutely necessary: where they are observed, medicines will become less needful; and when needful, they will, in their operation, be more effectual; but where they are neglected, the physicians and surgeons will be subjected to the very unpleasant trouble of giving their attendance, and of prescribing, to very little purpose. Warmth ought also to be attended to.

In such establishments as Forton, cleanliness, a free circulation of air, proper diet, &c. ought, agreeably to the very particular orders which you issue, to be most rigidly attended to, from one end of these establishments to the other. But, I am afraid, orders are not always rigidly executed. The unpardonable neglect of servants, in not executing,

with promptitude and scrupulous punctuality, the orders with which they are entrusted, is to be lamented, but, I fear, not to be, on all occasions, either prevented or corrected. From what I know of the establishments in question, I shall venture to say, that, were they always to be properly conducted by the servants who have the immediate charge of them, we should hear less frequently of the prisoners, &c. falling a prey to contagious fever than we have hitherto done. This is a subject, however with which, at present, I shall not further concern myself, excepting to make the following observation, which is, that while due care is not taken, in the first instance, to prevent contagion from taking effect, the use of Dr. J. C. Smyth's nitrous vapour becomes, undoubtedly, the more particularly necessary: but I am extremely sorry to think that Dr. Smyth's plan, as well as others equally well intended, should not always be put into execution, but more especially in cases of emergency, with that facility, with that eagerness, with that candour, which duty, justice, and humanity, continually require.

Although I have, in the course of these observations, laid very considerable stress on cleanliness, ventilation, changing of wards, &c. yet I would not by any means, wish it to be supposed that I have done it with the view of superseding the use of the nitrous vapour: on the contrary, while on the one hand I am sensible that the nitrous vapour cannot, without cleanliness, ventilation, changing of the wards, &c. be so efficacious as we could wish, in putting a stop to contagious fever, I am on the other hand, no less sensible that that fever, when raging to a violent degree, cannot be exterminated by means of cleanliness, ventilation, &c. without the assistance of some other means. With respect to hospitals, ships, prisons, &c. where people are crowded together, where the introduction of contagious fever is dreaded, or where it actually prevails,

the nitrous vapour, with due attention to cleanliness, ventilation, &c. may, at once, I presume, not only be considered the most convenient, the most elegant, and the most ingenious, but also the most efficacious remedy for the purpose of counteracting different species, of contagion, that has yet been offered to the public.

Further, although cleanliness, ventilation, and the changing of wards, very strictly attended to, might, in a very great measure, prevent contagion from taking effect, or from spreading extensively, yet, supposing them to be attended to as strictly as from the nature of things it is possible, they could not, I am too much afraid, destroy contagion, when prevailing in an extensive hospital, &c. For example, let us suppose only five or six hundred patients, confined in Forton hospital, and labouring under contagious fever; and let us also suppose it necessary, for the sake of cleanliness, and of putting a stop to the contagion, to shift completely all these patients once, perhaps many of them twice, and some of them even thrice every day; how, give me leave to ask, would it be possible to furnish such a great number of patients so frequently with the clean things required? For my part, I am fully persuaded that it would prove difficult; so extremely so, indeed, that it would amount even to an impossibility. With respect to ventilation, has it not been found, even when it has been attended to very particularly, to be, without the assistance of other means, inadequate to the speedy destruction of contagion? And with regard to the changing of wards, were it sufficient of itself to destroy contagion, might it not, I shall say sometimes, from the number of patients received being equal, nay even more than equal, to all the wards of which the hospital consists, be utterly impracticable? Other examples, and other queries, to the same effect, were they not deemed superfluous, might be advanced: then,

considering the business in this point of view, does it not become a duty incumbent on us to look out for, and to try other means more active, and more diffusive, which, with the assistance of cleanliness, ventilation, changing of wards, &c. may be employed for the purpose of more speedily, and more effectually destroying contagion? and may not the nitrous vapour of Dr. J. C. Smyth, as I have already mentioned, be deemed, of all other remedies extant, the most convenient, the most elegant, the most ingenious, and the most efficacious for answering the wished for purpose, whether at sea or on shore?

The extraordinary effects which we have seen the nitrous vapour produce, in cases of putrid ulcers, are facts of the utmost importance to mankind, and certainly deserve the most serious attention of medical practitioners. They not only show, in the most satisfactory manner, the power of that vapour in such cases, but also point out, in my humble opinion, the probability of its having, in a similar way, as salutary a power in contagious fever, and in many other diseases proceeding from other species of contagion. This opinion may, perhaps, seem singular; but I shall endeavour to evince its consistence with reason and experience.

In hospital practice, it has been frequently observed, not only by me, but by other medical practitioners, that all the ulcers of patients in the same ward have on a sudden, and nearly at one and the same time, changed from, apparently, a healthy, to a foul, sloughing, or putrid state. I have bestowed considerable attention in observing this change; and, in the course of my practice, have been able to make the following remarks, which I shall here arrange as they stand among my memorandums.

That, first, one ulcer degenerated, then another,

and so on, until all the ulcers in the same ward had taken on a similar disposition.

That those ulcers nearest the one which first degenerated were sooner affected than those at a greater distance.

That this lamentable change did not happen in all the surgical wards at the same time.

That the patients, when their ulcers were in this degenerated state, laboured, more or less, under symptoms of fever, such as a frequent, small pulse, unnatural heat, sometimes chilliness, dry skin, loss of appetite, &c.

That common dressings, common poultices, carrot poultices, turnip poultices, myrrh, Peruvian bark applied to the ulcers had no good effect.

That Peruvian bark, wine, opium, given internally had, I thought, instead of good, bad effects.

That, in one case, yeast was tried, both internally and externally, but the disease evidently gained ground under the course.

That the acetum nitrosum*, whether used internally or externally, seemed to have good effects.

That the changing of the wards had always good effects.

That the nitrous vapour, with the like attention to cleanliness and ventilation as was in common bestowed, had, without changing the ward, as in the five cases mentioned, as well as in many others, effects superior to those resulting from the changing of the ward, without the use of the nitrous vapour.

That the nitrous vapour had not the like good effects, without cleanliness and ventilation, as with them.

From these premises, I have thought it warrantable to draw the two following conclusions:

* Vide Paterson on Scurvy.

1. That such a degeneration of ulcers, in hospitals, from, apparently, a healthy, to a foul, sloughing, putrid state, can only be accounted for on the principle of contagion.

2. That the nitrous vapour, with due attention to cleanliness, ventilation, changing of the wards, &c. is, seemingly, the remedy, of all others extant, best calculated for preventing, or speedily destroying that contagion; and from this naturally arises the following query:

As, under such regulations, the nitrous vapour has so great power in preventing or destroying one species of contagion, may it not, under the same regulations, be equally powerful in preventing or destroying other species of contagion?

I must here observe, that the second conclusion does not exclude the use of other medicines. Suitable remedies, both internally and externally, used at the same time with the nitrous vapour, will, no doubt, forward the cure. But, as these pages are intended for the purpose of pointing out some of the effects of Dr. J. C. Smyth's nitrous vapour, and not as a treatise on ulcers, I cannot, with respect to the latter, make, with any degree of propriety, an attempt at either the indications of cure or remedies.

On the present subject, I might, to what has been advanced, add many more medical observations, were I not of opinion that, after the experiments of Dr. Smyth*, they would appear superfluous; and I might, with equal propriety, have recourse to chemical reasoning, were I not prepossessed with the idea that, considering what has been already said, respecting Dr. Smyth's nitrous vapour, by that very ingenious chemist Mr. Keir,

* Vide Dr. J. C. Smyth's letter to the Right Honourable Earl Spencer, &c. &c. &c.

of Birmingham*, it would be extremely presumptuous.

On the whole, and to conclude, I cannot help being of opinion, as well from the facts with which Dr. Smyth has favoured the public, and from what Mr. Keir has advanced, as from my own experience, that very great benefit must result to mankind from the *proper use* of the nitrous vapour, on board of ships, in hospitals, in prisons, in all places where people may be crowded together, and even in private families, in preventing and in putting a stop to contagion, as well as in mitigating and removing other diseases, in which other medicines would not perhaps have the like good effects. And, therefore, I most sincerely wish that the plan of Dr. J. C. Smyth may be universally adopted; and that it may, for the good of our navy and army, for the honour of our country, and for the benefit of mankind, be practised by medical men, and others, without their conceiving any prejudice against either it or its ingenious Author.

I have the honour to be,

Gentlemen,

Your most obedient,

Very humble servant,

Montrose,
12th August, 1797.

DAVID PATERSON.

* Vide Dr. J. C. Smyth's letter to the Right Honourable Earl Spencer, &c. &c. &c. Appendix.

POSTSCRIPT.

Since finishing the preceding letter, I have had an opportunity of making further trial of the nitrous vapour, in a disease of a singular nature. The hooping cough, which has been prevailing here all this summer, made its appearance in my family last month; this being a contagious disease, and a change of air having been found useful in removing it, I supposed that the nitrous vapour might not only operate in counteracting the contagion, but also have effects similar to the changing of situation; and hence, that it might, providing the lungs of my little patients could bear it, prove a convenient, an elegant, and useful remedy, on the present occasion. It was from these conjectures, and knowing that it would have been extremely inconvenient for me to have sent my children from home, that I ventured to make trial of Dr. Smyth's fumigating plan; the result of which I shall state, as briefly as possible, by sketching the following cases.

My third child, a girl of five years old, was seized with a slight inflammation of the throat, attended with hoarseness, about the 6th of last month; and about the 10th with a cough, on which the inflammation and hoarseness went off, the cough for some days, seemed to be of a common kind, from cold; but by the 15th it assumed the appearance of hooping cough, accompanied with a slight degree of fever. By this time my second child, a girl of six years, and also my fourth or youngest, a boy of fifteen months, had begun to cough*.

On the 17th, the third child had frequent and violent fits of coughing, with the hoop strongly

* My oldest child had the hooping cough about three years ago.

marked; and the second and fourth, though not so ill, evidently laboured under the disease. In the evening of this day, I began the use of the nitrous vapour. I shut up my little patients, with a servant, in their bed-room sixteen feet by twelve, and six feet nine inches high, myself superintending the business. Instead of a pipkin for holding the hot sand, I used an iron pot, in which was placed two gallipots, containing the concentrated vitrollic acid and nitre, according to the directions of Dr. Smyth. In about five or six minutes the room was filled with vapour, and continued so for an hour, without any of the children coughing or showing any signs of uneasiness.

18th, 19th, 20th. The fumigation was repeated every evening, and continued an hour, without coughing or any uneasiness occurring.

21st. Now, all my little patients seemed better, the fits of coughing recurring less frequently, and the mucus being more easily discharged than before.

14th September. From the 20th ult. to this time, the fumigation was repeated only six times; exactly in the same manner as before, without the children complaining of, or apparently feeling any disagreeable effect from it; and now, on account of the mildness of the disease, the cough not being troublesome even in the night, it was discontinued.—At this time the youngest child evidently laboured under symptoms of teething; the cough, however, did not appear in the least aggravated.—To the second and third child, during the course of the nitrous vapour, no other medicine was given; but to the youngest, who was frequently constipated, a weak solution of antim. tart. which always operated downwards, and sometimes upwards, was occasionally administered.

23d. The second, and third child, continue well; and the youngest, though much distressed with teething, coughs but seldom and very gently.

Now, after having stated these facts, whether or not the nitrous vapour had any effect in counteracting the contagion, or otherwise rendering the disease mild, and of short duration; or whether or not the disease would have naturally appeared mild, and have continued but a short time, without the interference of art, are points which I shall not take upon me to determine. Further trials are undoubtedly necessary for the purpose of forming a judgment. It must be confessed, however, that, even the few trials which have already been made, serve, in the mean time, a very useful purpose; they clearly show, that even young children labouring under a disease, in which there is always, more or less, a determination to the lungs, &c. are capable of inspiring the nitrous vapour without feeling from it any disagreeable effects: hence there cannot, I presume, be any objections to further trials of it being made in the whooping cough. Also, these facts lead naturally to other important inferences, but as they must be to you sufficiently obvious, I avoid making them.

I have the honour to be,

Gentlemen,

Your obedient

Humble servant, . .

Montrose,
23d Sept. 1797.

DAVID PATERSON.

Extract of a letter from Mr. Abraham Bassan, Surgeon of his Majesty's Hospital Ship Union, to the Commissioners of Sick and Wounded Seamen, dated the 22d of November, 1797.

" I use the nitrous fumigation every day through the ship, and, as formerly, in the ulcers, from the Sandwich, I found they spread and became foul from local debility, being never apparently benefited by the bark, wine or generous diet, and I used the nitrous fumigation to the ulcers, after washing them clean, with great success."

Three Letters from Mr. James M'Grigor, Surgeon to the 88th Regiment, at Jersey. The two first addressed to Dr. Carmichael Smyth, and the last to Dr. Garthshore, of London.

Jersey, October 8, 1797.

SIR,

As Surgeon to the 88th regiment, I have for these last four years, been witness to the dreadful ravages of an infectious fever in different quarters of the world. In England, in the island of Jersey, on the continent of Europe, during a voyage to, and in different islands of the West Indies, this fever has been the scourge of the regiment to which I have the honour to belong, and after a trial of every mode of practice which I could learn, it proved extremely fatal.

On my return from the West Indies, having seen in Duncan's Annals of Medicine an account of your work on fever, I determined to take the earliest opportunity of giving a trial to the milder which you recommended, of weakening and destroying contagion.

The 88th regiment, for nine months previous to their landing in Jersey, had been in the most healthy condition; they landed on the 6th of June last, and continued in the same healthy state till the middle of last July. On the 17th of July, the first case of a fever, which has since very generally prevailed, made its appearance. The person was seized with the worst symptoms of low typhus fever, and died on the 5th day. Having four years before, in this island, in the course of ten weeks, lost fifty men in the same fever, I determined to give the fullest and fairest trial to any thing recommended by you. I had every assistance from one of the ablest commanding officers, Col. Bursford.

To diffuse the contagious poison, I ordered the men, on the first appearance of fever, to be moved

from the barracks, (which are in an unhealthy situation) to tents pitched at some distance, on a dry and healthy spot.

To destroy the virulence of the contagion, where it evidently existed, I made my two mates regularly fumigate the barrack-rooms and hospital with nitrous vapour, in the manner you direct, the event will shew the success, of perhaps the first trial of your excellent invention, in the army.

Of fifty-four cases of this fever, which occurred from the 17th of July to the 24th of September, the first is the only one that I have lost. The very remarkable effect of the nitrous fumigation appeared from the great diminution of the number taken ill, after it was used. During the first week twenty-four cases appeared, in the second week, ten, in the third, seven cases; and to this date*, the number of cases continue to lessen.

The effect of the nitrous fumigation is evident, not only in the diminished number of cases, but also in their degree of virulence. The cases that have of late appeared, have been gradually becoming milder, and are now what a late writer would call cases of simple fever, having neither petechiæ nor any dangerous symptom.

As your work on fever has but lately fallen into my hands, I have been able, only in few instances, to follow the practice which you recommend; every thing indeed has been so completely effected, by following your manner of destroying contagion, that, in general, little has been left for me, but to obviate debility.

If you should wish to make any use of this communication, or should favour me with any thing further regarding your truly valuable discovery, please address for me to the care of our agent, A. M'Donald, Esq. Pall-Mall court, London.

In a Memoir which I transmitted to the Army

* The 8th of October.

Medical Board lately, after an account of the fever which appeared in the 88th regiment, I gave an account of the success of your plan, and thought it my duty to recommend it to the attention of the Board.

I have the honour to be,

Sir,

Your very obedient humble servant,

JAMES M'GRIGOR,

Surgeon 88th Regiment.

Dr. Carmichael Smyth.

Jersey, December 9, 1797.

SIR,

By a letter of yours, of the 26th of October, with which I was favoured, I was happy to learn that my conduct had met your approbation.

In September last, I sent to my friend Dr. Garthshore, a copy of my Memoir to the Army Medical Board on the fever that lately prevailed in the 88th regiment. At his desire, I about three weeks ago, sent him an abridged account of two memoirs on this fever, which I believe he intends to transmit to Dr. Duncan, for the second volume of the *Annals of Medicine*. Presuming that it would be satisfactory to you to see them, I herewith enclose you copies of my first memoir, and of the abridged account sent to Dr. Garthshore. I had nearly finished a second memoir, and hoped to be able to have concluded my *statement* of the fever, with an account of its extirpation; but a few more cases have of late occurred. The appearance of these last cases is however very naturally and easily accounted for; and the treatment of them adds a still further testimony to the efficacy of the nitrous fumigation, and of the treatment formerly pursued.

About the middle of October last, from the almost total disappearance of the fever, we relaxed considerably in the fumigation; the only cases then in the fever hospital, were convalescents from fever. About this time, the different encampments breaking up, we were obliged to admit a good many pneumonic and some dysenteric cases, which crowded this small hospital, (an old farmhouse hired for an hospital) and I was alarmed to see the fever break out again with all the original symptoms in six or seven convalescents. By attention to the different circumstances regarding fumigation, following the former treatment, and thinning the different rooms, matters are now brought to nearly the same good state as before the reappearance of the fever.

The reappearance of the fever has, however, not been entirely without its advantages; it has been the means of shewing me a fact, which, especially in military practice, I conceive to be of the first importance. It has pointed out to me the efficacy of the nitrous fumigation in destroying dysenteric contagion. I have often been witness to the rapidity with which the contagion of dysentery flew through the wards of an hospital, and how apt convalescents from other diseases, and in particular from fever, were to be seized with this disease. Though thirteen cases of dysentery were sent to the hospital, and some of them with very severe symptoms, I know only of two instances where the disease was communicated in the hospital, and with the exception of two chronic cases, the cure in all, has been much speedier than I have formerly seen it under the same treatment.

Confident of success, I wish much for opportunity of trying the fumigation in other contagious diseases, particularly small pox. In two cases of cynanche, attended with low fever, I used it, and both patients (officers) are now well. I should be

glad to hear if you have extended the trial to other diseases.

Some other circumstances regarding our fever, I think proper to mention to you.

So sanguine was I at one time, in my expectations from the fumigation, that in some cases of the fever which I set apart, I trusted solely to nature and industriously fumigating, but I soon saw that in these cases I was rapidly losing ground. I next in conjunction with the fumigation, followed Dr. Cullen's plan of treatment; this in every case protracted the cure, and in several instances, I was obliged totally to abandon the plan. Being in possession of such powerful means of destroying the contagion, as the nitrous fumigation, I ventured to take the opportunity of giving trial to, and comparing several of the modes of practice recommended in fever; but a comparison of cases as nearly equal as could be collected, gives the most decided superiority to that recommended by Dr. Robinson of Greenwich. But I think it likewise proper to mention, that under the type which fever lately assumed in this island, however proper the immediate exhibition of the bark was here, that it was by no means found so proper a remedy in other situations. In the West Indies, every trial given to the bark in the yellow fever during the paroxysm failed, and this not only with me, but in the hands of the physicians who had the charge of the largest hospitals there.

I shall never sufficiently regret my being unacquainted with your discovery, while in the West Indies; and though doubtless it will for a time, meet with the fate of every other that has been made for the benefit of mankind; yet if candid and liberal practitioners will but do their duty, and give it a trial, I am confident it must soon carry conviction, and that you will derive that credit from it, which you so justly deserve.

I have for some time been in the practice of

keeping journals of my cases; every case of this fever that has occurred since its origin, has been registered either by myself or by one of my assistants. The garrison surgeon here, and his assistants likewise, have witnessed the treatment; and the different facts mentioned in my memoir, are not unknown to several practitioners in the island. Any information which you may require from me at any time, regarding the trials of the nitrous acid, and the other means recommended by you, I shall most readily give.

I have the honour to be

With the greatest respect,

Sir,

Your most obedient humble servant,

JAMES M'GRIGOR.

Dr. Carmichael Smyth.

* *St. Owen's, Jersey, Nov. 1, 1797.*

SIR,

As perhaps the confirmation or refutation of an *opinion* in medical science, especially of one that so nearly concerns mankind in general, as a mode of obviating contagion, is not less useful than a new theory, a new medicine, or a new mode of curing a disease; I shall lay before you some facts, which, I think, confirm the method of obviating and expelling febrile contagion, which has been recommended by Dr. C. Smyth.

On the 17th of July last, a contagious fever of the typhus form appeared in the 88th regiment in this island. In different situations, this regiment had suffered severely for the last four years, from a fever of the same kind. In this island, three years ago, I had the misfortune to lose, in

* This letter has been already published in the second volume of the *Annals of Medicine*, and is only republished here from a wish to bring the whole of the evidence on this subject into one point of view.

the course of ten weeks, forty* men from this fever. Soon after our arrival in Jersey, in last June, and but a short time before the first case of this fever appeared, Dr. Smyth's work on fever came into my hands: I therefore, on the first appearance of the fever, gave the fullest trial to the use of the nitrous acid, and as the result shews, with the best success.

The account which I here give is extracted from two official memoirs, which I transmitted to the Army Medical Board, on the subject.

The fever had nothing remarkable in its appearance from typhus fever, as I have usually seen it occur, if I except the suddenness of the attack, often with delirium or epilepsy; a very remarkable degree of debility; and a great proneness to relapse. Two cases had the scarlet eruption with angina, and most of the first cases, until they were sent to camp, and were exposed to a current of air, had petechiæ. In most of the first cases, the contagion could be clearly traced.

On the first appearance of this fever, alarmed at the fatal issue of the first case, I myself not only carefully fumigated the hospital, the clothes, and bedding of the sick, with nitrous acid, but my two assistants, Messrs. Bruce and Brown, likewise constantly fumigated the different barrack-rooms†.

Every man as soon as seized with the fever, was removed from the barracks, which are unhealthily situated, to tents pitched in a dry and airy situation, about a mile distant. The barracks were likewise thinned, by encamping or removing from them near half the regiment.

The *treatment* in general was, by immediately exhibiting the bark after giving an emetic or cathartic, and afterwards giving cordials, blisters, &c.

* There seems to have been a mistake here, as in his first letter to me, he states the number to have been fifty.

† The rooms, by this process, were rendered sweet, and the men themselves soon became sensible of the comfort of it. Vide first Memoir sent to the Army Medical Board.

as indicated. The lavatio frigida, in several cases, seemed to answer exceedingly well.

The *first* case, which appeared on the 17th of July, died on the fifth day, with symptoms which are usually called highly putrid. This excited a very general alarm in the regiment.

I shall here from my journal of cases, and the copies of reports made to the Medical Board, give a statement of the appearance of the cases of the fever: nothing can afford stronger proof of the efficacy of the means adopted to obviate and remove this disease.

From July 17 to July 28,	20 cases appeared.
From July 29 to Aug. 4,	16 _____
From Aug. 5 to Aug. 11,	10 _____
From Aug. 12 to Aug. 18,	8 _____
From Aug. 19 to Aug. 25,	3 _____
From Aug. 26 to Sept. 1,	2 _____
From Sept. 2 to Sept. 8,	4 _____
From Sept. 9 to Sept. 15,	1 _____

From this time, till the sick were removed from the tents, to a house where they were crowded, hardly another case appeared. At this period, however, about the 20th of October, the fever with the original symptoms again appeared among some convalescents, and pneumonic cases; but by putting in practice the nitrous fumigation, and thinning the wards of the hospital, the fever was again very soon got under.

Of the total number of cases of this fever that occurred, viz. sixty-six*, the first is the only one that was lost; this, no doubt, is remarkable, and I not only ascribe this success to the use of the oxygenated nitrous acid, but I likewise think it highly probable, that by fumigating with this acid, the contagion is now nearly extinct, and that by its use,

* A very large proportion this of the regiment, which consisted only of four hundred men.

more cases of this fever have been prevented from appearing.

I have nothing at present to add to what Dr. Smyth has said of the use of the nitrous acid; every trial which I have made hitherto, tends to confirm his experiments. I have set on foot a trial of different other acids*, which however is yet so incomplete, as not to allow me to say any thing of their comparative merits. Justice to the author of so valuable a discovery, and a wish to make more public, what is so interesting to mankind, has induced me to say so much†.

I am, &c.

Dr. Garthshore,
London.

JAMES M'GRIGOR.

For the following Communications, I am indebted to my Friend Dr. Johnston.

Queen Street, Portsea, December 23, 1798.

DEAR SIR,

When I had the pleasure of seeing you at Portsmouth, I had experienced the good effects of the nitrous fumigation in arresting contagion, and would have communicated my observations to you on this subject ere now: but unfortunately the disease has been *reintroduced*, by receiving men ill of typhus fever, and dysentery, from the Hillsborough transport, bound to New South Wales with convicts. I am, therefore, still pursuing Dr. Smyth's method of fumigation, and am happy to

* We attempted, likewise, the extrication of the muriatic acid gas, but with great inconvenience, and it is obviously not so proper as the nitrous. Vide first Memoir.

† I am very confident, that in various situations the attaching to every regiment one large tent, and allowing the materials for the nitrous fumigation, would materially benefit the service. Vide first Memoir.

say, that, I have, a second time, experienced the most happy and beneficial effects from it. I will, as soon as possible, forward to you, through Mr. Palmer, the particulars of my success, and one advantage at least will arise from this unavoidable delay, viz. the pleasure of seeing the fumigation succeed a second time, under the very unfavourable circumstances of *bad weather*, and direct communication with the said transport, from on board of which twenty-two sick convicts have been received, and placed under my care at Langstone harbour. I believe if we had not received the said twenty-two men, that we should not at present have a single sick man among the convicts.

I am, &c.

(Signed)

SAMUEL HILL.

Dr. Johnston.

Queen-street, Portsea, January 13, 1799.

DEAR SIR,

Herewith I have the honour of forwarding to you some remarks I have made on the effects, very happy effects of the nitrous acid fumigation, in stopping the progress of a contagious fever on board the hulks in Langstone harbour; and I am happy to convey to you my decided opinion in its favour: an opinion, not hastily formed, but founded on facts, which occurred on trying that excellent method of preventing, and lessening some of the miseries of our fellow-creatures.

I will esteem it a particular favour, if you will peruse the enclosed letter, and forward it to Dr. Smyth.

I remain, dear Sir, &c.

(Signed)

SAMUEL HILL.

Dr. Johnston.

Portsea, January 13, 1799.

SIR,

HAVING with great pleasure perused your publication on the fever, which prevailed among the Spanish prisoners of war at Winchester, and also your account of the success attending the nitrous fumigation, in destroying contagion on board the Union hospital ship, and on board a squadron of Russian ships of war at the Nore; I determined to try its effects on board the hulks in Langstone harbour, near this town, the first opportunity that might offer.

A fever of a contagious nature made its appearance on board the said hulks, in the month of July, 1798, which soon became alarming, not from the number of sick only, but from the rapidity with which it advanced to its last or fatal stage. The number of patients continued increasing from the 6th of July, to the 29th of August; in the former month sixteen were received, in the latter sixty-six. Upon my representing to Mr. Dyne, contractor for the care of convicts on board the said hulks, that I thought great benefit would ensue, if the method of fumigating recommended by you was put in practice at Langstone harbour, he with a liberal hand supplied the concentrated vitriolic acid and nitre, and humanely ordered, that no expense might be spared in attempting to stop the progress of the fever.

Pipkins, &c. were procured here without loss of time, and we began fumigating on board the Sincerity hospital ship, on the 29th of August, 1798, at which time it contained fifteen very ill of fever, fifteen recovering from fever, (and three of other complaints left in July) thirty-one had returned to the prison cured, and five had paid the debt of nature.

It was with extreme pleasure I observed the effects of the vapour on many of the fever patients. I will state them on one, which, with little variation, will serve for the rest.

Daniel Stowell, aged twenty-seven, was received into the hospital-ship on the 21st of August, where he had continued getting worse till the commencement of the fumigation, he was then in the following state. A most severe and confused pain in his head, with intense heat on the skin, and insatiable thirst; tongue rough and extremely dry, appearing like a burnt crust, and of a blackish colour, inability to put it out of the mouth when desired; teeth and gums covered with the same kind of fur as the tongue. Pulse one hundred and thirty-one, small and weak. The vapour made him cough very much, and he requested, (his own words) *to be smoked no more*; it was, however, repeated three times this day. August 30, Pulse one hundred and one, and stronger, some moisture on his tongue and gums, heat on the skin greatly decreased; head-ach much the same; thirst not so intense: fumigated three times this day. Thirty-first, He was in every respect better; continued the fumigation three times. September 1st, Pulse seventy-nine, and still stronger than the two preceding days; other symptoms much relieved: continued the fumigation. Second, Pulse sixty-eight, strong and regular; his appetite permitted him to take more nourishment than he had been able to do since his illness: from this day to the ninth, he continued getting better, and I now considered him in a state of convalescence.

It is proper here to remark, that this man had an ulcer on his right leg, extending from the outer ankle across the anterior part of the tibia to the gastrocnemius muscle, at which part it was four inches broad, and very deep, and discharged a thick ill-conditioned matter, which was very offensive.

Its length was rather more than six inches. After some days fumigating, I observed a change for the better in the appearance of the ulcer, and as I had tried a variety of methods to heal it, for many months before he became ill of the fever, without producing any good effect; I laid this change to the effects of the vapour. I now directed it to the ulcer itself, and continued its use till October the 30th, when his ulcer was cicatrised; and I verily believe, to its efficacy is owing this poor man's cure. He is gone to New South Wales in the Hillsborough, which sailed just before Christmas last; I saw him the day before he embarked on board her, and the cicatrix was very firm: the ulcer was the consequence of an old gun-shot wound.

There is another case of ulcer which I think has mended greatly since I fumigated it; I am proceeding as in the former case, and I have great reason to believe it will ultimately prove successful. The only dressings used during the fumigation, or more correctly speaking after the commencement of the fumigation, were dry lint and ung. resin. flav. over which was laid a rag of linen, constantly kept wet with aqua. lytharg. acetat. diluted with water.

Finding such beneficial effects from the fumigation on board the hospital ship, in bringing the fever sooner to a conclusion, by shortening all its stages, I determined to apply it to the source of the contagion; and accordingly the prison hulks, la Fortune and Ceres were fumigated every night from October the 15th to November the 20th, (except two nights, the servant who was sent for the acid to town (Portsea) having staid the first night at a public house, and not arriving in time to fumigate the next night,) and I had the pleasure of finding the sick reduced to eight; and seven days had elapsed, and not one patient had been sent to the hospital-ship. The fumigation was now discontinued.

November the 21st, eight men were received from the Hillsborough Botany Bay ship, one of which number was in the last stage of a contagious fever, and two laboured under dysentery.

Several patients in a state of recovery caught the new contagion, and many attendants were taken ill with the diarrhœa and dysentery; and as it was impossible to prevent communication with the prison hulks, the prisoners again became sickly, and many died; some of whom were not ill three days before that awful event took place; and one man in particular died delirious twelve hours after he was received into the hospital-ship.

The fumigation, which I considered as the anchor of hope, was again resorted to November the 26th, and continued to the present time, January the * 13th, 1799; and it is with superlative satisfaction I add, that there has not been a patient received for the last eighteen days, neither is there a single fever patient in the hospital.

It is not my intention, neither is it necessary to trouble you with a detail of my method of treating this fever; what I have to say relating only to the happy effects of the fumigation, and it is with peculiar pleasure I assert, that the progress of the fever has been twice completely arrested by perseverance in its use; it may, however, be necessary and proper to say a few words on its first introduction, and on its fatal effects on many who were its victims; I will, therefore, relate the case of one patient, which will shew incontestibly the nature of the disease.

The first person taken ill, was John Smith a convict, who had been sent from Newgate a short

* Dr. Smyth will be pleased to add three days more to the time which had elapsed on Sunday last (the 13th) without having received any patient whatever from the hulks into our hospital-ship.—Postscript of a Letter to Dr. Johnston, dated the 16th of January.

time before. He informed me July 6th, 1798, the day he was received on board the hospital-ship, that he had been ill of a fever in Newgate, and had not recovered his strength when he was sent to the hulks, at Langstone harbour. The convicts having been remarkably healthy, previous to the reception of this man, and becoming very sickly immediately after his admission, I considered the fever as introduced by him. He complained this day, (July 6) of head ache; pains in his back, loins, and extremities; his skin was very hot and thirst great; tongue covered with a yellowish mucous; countenance of a yellow tinge, and great dejection of spirits; pulse ninety six, and weak. Seventh, All his symptoms seemed aggravated, his pulse one hundred and seventeen.

Eighth, He was delirious, and required at least two attendants to keep him in his cradle; pulse; one hundred and forty. Ninth, He was covered with myriads of petechiæ, and became extremely offensive: I was now unable to reckon his pulse. Tenth and eleventh, His petechiæ had run into each other so as to form large blotches. Twelfth, There was a great discharge from his nose and ears, of a very dark colour and very thin. Thirteen and fourteen, The stench from him was offensive in the extreme. On the fifteenth he died universally convulsed.

The annexed Table will show the numbers taken ill before and after the commencement of the fumigation. The 9th and 10th of November were the days on which it was omitted, and it is remarkable that although on the former day no patient had been sent to the hospital, on the two succeeding days, seven were brought each day.

I have not, Sir, the honour of being known to you; but liberality and love of truth induce me to forward to you the above particulars, which I

hope will be received as a token of that esteem
and regard with which

I am, Sir,

Your most obedient humble servant,

SAMUEL HILL.

Dr. Carmichael Smyth.

N. B. There were 748 convicts on board the two hulks on the 6th of July, 1799; of these, 418 were received into the hospital with the jail-fever, besides 24 from on board the Hillsborough, total 442, of whom 71 died of the distemper.

A monthly and daily RETURN of the CONVICTS attacked with the Jail-Fever on board the Hulks, and received into the Sincerity, Hospital Ship, in Langstone Harbour, from the 6th of July to the 26th of December, 1798. By S. HILL, Surgeon to the Hospital.

Months	Days	Number	Month	Days	Number	Month	Days	Number	Month	Days	Number
July	—	16	Oct.	16	3	Nov.	1	1	Dec.	1	3
Aug.	—	66		17	2		2	1		2	2
Sept.	—	120		18	1		3	—		3	3
Oct.	1	5		19	2		4	1		4	5
	2	3		20	3		5	—		5	—
	3	7		21	4		6	3		6	5
	4	11		22	3		7	1		7	4
	5	3		23	1		8	1		8	3
	6	7		24	3		9	—		9	2
	7	3		25	2		10	7		10	2
	8	4		26	1		11	7		11	3
	9	2		27	2		12	3		12	2
	10	2		28	1		13	1		13	1
	11	6		29	1		14	—		14	2
	12	8		30	0		15	—		15	1
	13	3		31	1		16	—		16	3
	14	5					17	—		17	2
	*15	9					18	—		18	2
							19	—		19H	6
							*20	—		20	2
							21H	—		21	2
							22	1		22	3
							23	—		23	2
							24	7		24	1
							25	4		25	1
							*26	2		26	2
							27	3			
							28	2			
							29	2			
							30H	3			
To the 16th		78	To the 31st		30	50		64			

* On the evening of the 15th of October, we began to fumigate the hulks, and continued to do so every day to the 20th of November, (the 9th and 10th of this month excepted;) on the 20th, the fumigation was discontinued, but resumed on the 26th, and continued without interruption to the 13th of January, 1799, though on the 26th of December the sickness had intirely ceased.

[H] On the 21st of November, eight persons ill with the jail-fever, or dysentery, were received into the hospital, from on board the Hillsborough Botany-bay ship, outward bound; eleven more were received on the 30th of the same month and five on the 19th of December: in all twenty-four.

Forton Hospital, Jan. 17, 1799.

SIR,

A friend of mine having informed me that you were preparing for the press some additional experiments, to prove the utility of the nitrous acid fumigation, in destroying contagion, I take the liberty of submitting to your notice some facts which have occurred to me on this subject. If you will honour them with a perusal, and think them of sufficient importance, I shall feel myself highly flattered, should they, through your sanction, become more publicly known.

From the 4th to the 12th of April, 1797, we were employed at this hospital in receiving prisoners infected with the jail fever. These men had recently arrived in some transports from Wales: They formed part of a new regiment which had landed there, and, previous to their sailing from Brest, had been released from various prisons in France.

This fever was generally attended with petechiæ, and, in some cases, the parotids were affected. From these symptoms, and, from its being highly contagious, it was thought immediately necessary to fumigate with the nitrous acid in greater quantity than we had hitherto done, and, instead of *three* fumigating pipkins in each ward, we increased them to *six*. This method appeared to have a very desirable effect, for by filling a fever-ward with the vapour to such a degree that the smallest part of it could not escape the influence of the nitrous gas, we never failed to render the air of that ward sweet and refreshing for some hours. Here I must beg leave to remark, notwithstanding the prejudices that are abroad, that I never remember the vapour having appeared too powerful for any fever-patient to bear, and although phthisically inclined myself I could always bear it without inconvenience. If, however, some inconvenience should occur, I conceive it only a secondary object of consid-

ration, when compared with the good effects to be derived from the fumigation, in checking contagion. The increased demand for the nitrous vapour, from the number of wards occupied in the hospital, occasioned the consumption of nearly three pints of the concentrated vitriolic acid, and a proportionate quantity of the purified nitre, each day. The expense of so increased a consumption, if an object, is certainly overbalanced by the considerable advantages resulting from its use; for, notwithstanding fresh contagion was every day brought into the hospital till the month of July, by means of prisoners received from the prison-ships, we had the satisfaction to see the malignity of the fever subdued; and by the unremitted attention of the physicians of the royal hospital at Haslar, with a due observance of cleanliness, we were authorised early in the month of August, to report to the commissioners for sick and wounded seamen, that the jail fever, which lately raged among the French prisoners at this port, existed no longer. The prisoners then, in proportion to their number, enjoyed an usual share of health, and which, previous to the introduction of the jail-fever, had been equal to the state of health of any number of working men in the manufacturing towns of England.

During the continuance of the jail-fever, *very few* of the establishment of the hospital caught the distemper, considering the length of time it prevailed at Forton. Those who received the contagion first, and were fond of drinking, either died, or had a very severe illness. Others, not so partial to liquor, and who received the infection later, in general recovered.

No putrid disease of any consequence made its appearance again in the hospital until the 3d of January, 1798, when we received some prisoners from his Majesty's prison-ships, Fame and Portland. These men, who had lately arrived in a transport from Falmouth, were affected with jail-fever; and

on many of them petechiæ appeared. I immediately acquainted the commissioners for sick and wounded seamen of the circumstance, who gave orders to the physicians of Haslar hospital to visit Forton, and report to them accordingly.

At this time the government of France had agreed to victual, clothe, and attend in sickness, their own prisoners. The sub-contractor in the medical department did not, however, take charge of the hospital at Forton, till the 11th of February following. We had, previous to that time, an opportunity of fumigating with the nitrous acid with apparent good effect. The business of the hospital from that time, came under the guidance of the French, but although they had two hundred and eighty-two patients put under their care, and upwards of one hundred of them affected with putrid fever, the acid vapour was totally discontinued for near five months. The state of the hospital, from the 11th of February, was highly alarming, and extremely unfavourable to the health of the prisoners; the number on the hospital books increased daily, the wards were so neglected that they soon appeared dirty, and had an offensive smell; the œconomy of the buildings was not at all studied for the advantage of the sick; fever and convalescent patients were not separated, and in the course of twenty weeks two hundred and thirty-five prisoners died, five hundred and thirty-seven remained sick in the hospital; and the jail-fever was raging with great violence.

On the 20th of May, Doctor Forzy, and Mr. Brunet, Surgeon, arrived here from France, who were appointed by the French government, inspectors over their sick and wounded prisoners in England. These gentlemen were placed at this dépôt to see that justice was done to the French prisoners. As they were versed in the management of hospitals, they soon perceived the great inattention that had been paid to the sick; and the irregu-

lar manner in which the duty of the hospital was carried on. They soon convinced Mr. Vochez of this situation of the sick prisoners, who lost no time in breaking the contract, and putting the management of the hospital into other hands, thinking it preferable to subject himself to the penalties of the law, than that one helpless prisoner should suffer by the hand of insatiable avidity and unfeeling neglect; a transaction highly honourable to Mr. Vochez, and the memory of which should always remain strongly impressed on the minds of those who were, or might be thereby benefited by it.

On the 1st day of July, Dr. Forzy and Mr. Brunet commenced the management of this hospital in the medical department. Their chief object was to put the buildings into a general state of cleanliness, and to fumigate the wards of the hospital with the nitrous acid. For this purpose Mr. Vochez very liberally purchased all that remained in the English store, and likewise sent down from London a large quantity of the concentrated vitriolic acid and purified nitre. The acid vapour, together with the new system of cleanliness, at the expiration of even so short a period as seven days, caused a very sensible change in the appearance of the patients, and the deaths, which during the previous week amounted to eighteen, were reduced to six the first week after the new administration took place. Every succeeding week a more healthy aspect presented itself. At the end of the tenth, the hospital might be perceived to have nearly approached a state of general convalescence. The number of contagious patients received from Portchester Castle, and the prison ships, were indeed considerably lessened; yet the deaths which had occurred were *sixty nine* in number, although the patients in the hospital were reduced to two hundred and seventy three. In the next ensuing ten weeks, the deaths decreased to thirty seven; the number of patients was two hundred and eighty six. At

this time all contagion had left us, and we had not received a patient with putrid fever, from Portchester or the prison ships, for near three weeks; and I have great pleasure in stating, that we have remained in the same healthy state ever since, and have not more than three hundred sick in the hospitals of Forton and Portchester, though they contain the sick of near ten thousand prisoners at this port.

I cannot help expressing the great praise that is due to Dr. Forzy and Mr. Brunet, for their very meritorious exertions in forming such salutary arrangements, and putting the hospital into such excellent discipline and order, and particularly for their uncommon zeal, and the indefatigable pains they took to see the hospital well fumigated with the nitrous acid, which there cannot be a doubt was exceedingly instrumental in crowning their urgent endeavours with the desired success.

From the foregoing statement, I think no one can hesitate to bestow the high encomiums that are due on this most excellent invention and its ingenious author, to whom every member of society should always think himself highly indebted.

I am, Sir,

With great respect,

Your much obliged humble servant,

JOHN GRIFFIN.

Jas. Carmichael Smyth.

Portsea, December 16, 1798.

DEAR SIR,

In answer to your favour of the 11th inst. I have very little to add to what I have said in my weekly reports, wherein the obvious difference of thirty the first week, and only three the next, being attacked with typhus, I in a great measure attribute to the nitrous fumigation, used in the way recommended

by Dr. J. C. Smyth, from which it also appears, that of thirteen ill in this latter time, I had only occasion to send two to the hospital, and that the infection was so far subdued, that even nine got well on board, by the emetics, antimonials, &c. used in the first stage of the disease, which I had not been able to accomplish previous to the use of the nitrous fumigation; I must also add, that the keeping fires constantly burning, and the sending those to the hospital who were first taken ill, might have some good effect; but the weather was so incessantly bad, we could not take advantage of wind sails, and indeed laboured under every other inconvenience; the *Defiance's* ship's company at this time, being on board the *Elephant* (a seventy-four) as a hulk, in the harbour. I imagine that the typhus fever was introduced into the ship by women, two of whom I sent on shore as soon as I discovered, one with a scarlet eruption, and certain degree of fætor,—Both Dr. Lind and Dr. Hope, are of opinion, the fever was of a very dangerous and infectious nature, and from Dr. Hope's opinion, I was more particularly led to be very attentive in removing the sick early to the hospital, but the nitrous vapour was scarcely used two days, when the symptoms abated, and has now entirely ceased.

The method I used, was by holding the pipkins under the hammocks of those with feverish symptoms, and at night, eight were carried about the decks, when all the hammocks and people were below, and this was attended with very little inconvenience to those in health. I have also used the nitrous vapour in the manner mentioned by Mr. Paterson for ulcers and foul sores, and I think, with obvious good effect, at least the patients themselves acknowledged it. I in general have a pot in fumigation, when I visit the sick in the cockpit, which I really think, independent of the utility of applying sores over it, tends to purify the air and dispel fætor, its smoke is particularly pleasant

to me, and I often have it in my cabin, when the sick are below. I shall be happy if these cursory observations appear to you at all satisfactory.

And I ever am,

Your obedient servant and friend,

JAMES GREGG.

J. Johnston, Esq.

Norman Cross, August 8, 1798.

DEAR SIR,

AGREEABLY to the wish you expressed, of being informed of any observations I might happen to make on the effects of the nitrous acid fumigation, in checking or destroying contagion; I have for a considerable time past, carefully attended to the consideration of that subject, especially since I read Mr. Paterson's ingenious letter addressed to the Commissioners of the Sick and Wounded Board: and although I have not been able to draw similar conclusions, with respect to its beneficial effects on patients afflicted with ulcers, it is because I was less observant and attentive perhaps, to that point, not having perused this gentleman's publication previous to my adopting a more successful mode of treating ulcers, I hope, than is generally practised or known.

Whether the nitrous vapour has peculiar specific powers for destroying contagion, is difficult to say. I have constantly fumigated the hospital wards three times a week, sometimes oftener, and I have strong reason to believe that the nitrous acid fumigation not only tends to prevent the spreading of contagion; but answers other salutary purposes.

Among the various trials I had occasion to make with the intent of ascertaining its effects on putrid effluvia, a circumstance occurred worthy of notice. The water closet adjoining the agent's office, be-

came in the very hot weather of June and July last, so extremely offensive, that Mr. Perrot and his clerks complained, that unless the factor was in some degree removed or mitigated, it would be impossible to continue much longer in the apartment. It is a room of twelve feet square: I ordered three pipkins in, and proceeded to fumigate for an hour, filling the place completely with the nitrous vapour. During this period, the door was unavoidably opened several times; but the agent, two clerks, and myself, continued there the whole time. It at first caused a little coughing; but in a few minutes that irritation ceased, and the vapour became rather grateful than otherwise. At the end of forty-five minutes, Mr. Gardner one of the clerks, declared he had felt for some time, an unusual sensation of hunger, which at the conclusion was extremely importunate, and he that day ate, as he expressed himself, voraciously. Mr. Richards the other clerk, felt nearly similar effects, though not so much exposed to the vapour as the former, who kept stirring one of the pipkins frequently. As I did not feel sensations of a similar nature at the time, I paid little attention to their observations; but on returning home, somewhat better than an hour after, my stomach became equally importunate and craving for food, in so much so, that it was with the utmost difficulty I could refrain till the usual hour of dining; and I may venture to say, that I ate nearly twice my ordinary quantity on that day.

Ten days after this I had the wards more than usually fumigated, in which I remained till the expiration of the process, and I felt equally affected with hunger, although a more than common degree of flatulency attended it. I ought to mention that the agent's apartment was rendered perfectly sweet and pleasant, the factor being wholly removed or destroyed. Mr. Perrot was so sensible of the change, that he requested some days after, to

have the fumigation repeated, because the smell was again becoming offensive.

Do not these facts evince the propriety of diffusing the nitrous vapour copiously in the convalescent wards, where loss of appetite, and want of tone in the digestive organs, often retard the perfect restoration of health?

Another circumstance well deserving our regard, with respect to the effect of the nitrous fumigation on contagion, occurred. Some time ago we had nearly forty patients in the Dutch hospital dangerously ill with typhus fever; old men who had been recently captured in the Greenland ships, and who laboured under great dejection of spirits. They were taken ill in the prisons, shortly after their arrival at Norman-Cross, and although we had a great many patients with slight complaints in the hospital, on the admission of those with typhus fever, yet not one of them, nor of the nurses, caught the disease.

This was not the case in the prisons, for several of the old standers there, were attacked with the fever. During the continuance of the disease, we were unremitting in our attention to fumigate the wards of the hospital daily, with the addition of several pipkins more than were commonly employed.

Are we not warranted then, in concluding that these prophylactic measures prevented the contagion from spreading and infecting the patients in the hospital; whilst those in the prisons, not having equal advantages, were attacked with the fever?

We were however fortunate enough to lose no more than one patient, who died on the seventh day in a highly putrid state; a clear proof of the malignant tendency, and contagious nature of the disorder.

I could enumerate a variety of other instances, where it appeared to me that the nitrous acid fumigation was attended with salutary effects; but what has been already said is, I hope sufficient to

shew that many benefits are likely to accrue from a more extensive use of this medicine ; and that it ought almost on every occasion, to have the preference to all other modes of fumigating, where contagion is prevalent.

It might certainly be used with much propriety and advantage in the sick births, and between decks, on board his Majesty's ships of war. It is true, where great moisture prevails, which is unavoidably the case in men of war, fires are absolutely necessary ; after which the nitrous gas should be liberally diffused throughout the ship : but prejudice, which frequently warps the best understanding, prevents many from adopting salutary measures, because these means had not been originally suggested by themselves, or because they happen to militate against some preconceived and favourite opinion.

But before gentlemen decide on any remedy held out to the public in a fair and candid manner, they should first subject this remedy to actual experiment, and then determine for or against it, according to the unprejudiced result.

I do not pretend to say that the nitrous acid ought to supersede all other preventive remedies ; on the contrary, ventilation and cleanliness must likewise be conjoined with it : but where contagious fever prevails, there is every reason to believe that these will prove the most effectual external means to subdue it.

I thought it my duty to say thus much in justice to the ingenious inventor of the nitrous acid fumigation.

I am, with the greatest respect,

Dear Sir,

Your very humble and

Obedient servant,

(Signed)

JAMES MAGENNIS,

Dr. Johnston.

Extract of a Letter from JOHN SNIPE, Esq. formerly Surgeon of the Sandwich, now Surgeon to the Naval Hospital at Yarmouth. Dated Yarmouth, June 17, 1798.

ON the 9th of March, when I joined the Sandwich, a contagious fever raged in that ship, there were daily ten, twelve, or fifteen men sent to the hospital, with fever and ulcerated legs. You are already acquainted with the steps that were taken to subdue this. Our success I attribute to cleanliness, free ventilation, and the diffusing daily the nitrous gas through every part of the ship, and I am convinced, that had that ship been fumigated three or four times a week, with the nitrous vapour, no such fever would ever have been generated, notwithstanding the great number of men that were on board. Suffice it to say, that in three months, this ship was as healthy as any other of her class, although we never had less than 1000 and often 1500 men on board. During the last twelve weeks that she was in commission, I only sent eight men to the hospital. When I first joined her, the smallest scratch rapidly degenerated into a foul ulcer, but after the febrile contagion was subdued, sores healed as kindly as in any other ship.

About three weeks before she was paid off, an Italian cut one of the seamen in the thigh with his knife, the wound was about six inches long, and nearly two deep, it was stitched up, and a double headed roller applied; it healed by the first intention, which was a proof that no contagion remained in the ship.

From some experiments I have made, I am induced to think that febrile contagion, and the general exhalations from the human body, are of an alkaline nature, and that the nitrous vapour equally subtile, penetrating into every crevice or corner, wherever it meets the former, destroys its pestiferous qualities, and renders it as inactive as a drop of

water. I have repeatedly condensed the breath and perspiration of patients in typhus fever, and upon adding an acid to it, an effervescence was visible: the method I took to obtain a sufficient quantity of liquid for the experiment, was to make the patients breathe on cold panes of glass, and to put the same under the bed clothes, close to the skin, when in a state of perspiration; in this way half an ounce may be procured in a short time.

Fumigating with the nitrous vapour cannot be too strongly recommended on board of all ships, in barracks, hospitals, prisons, close cellars, and houses that are not constantly inhabited. Some time ago I had occasion to go to a store room, that had not been looked into for three weeks or a month, it contained the bedding used by the Dutch prisoners before they were sent to Holland, the whole of which had been fumigated, exposed to the sun for two days, afterwards washed and perfectly dried before they were put in store; yet the room smelled very badly. I immediately ordered it to be fumigated with six pipkins, and next morning it smelled perfectly sweet: for which reason I have, and mean to fumigate all the store-rooms, every week.

Last winter I tried the nitrous vapour with some of the worst ulcers that perhaps were ever seen in any country; the pipkins were placed under the naked sores. It gave some pain, and I could not observe any good effects from it, but I beg leave to observe that this was not the fault of the remedy, but the untractable nature of the disease, for in many cases, no internal medicine, nor external application, had the least effect, amputation alone saved the patient's life. I mentioned this in a letter to Dr. Blane, at the time, but since then, I have found it of essential service in cleaning foul ulcers, buboes, and stumps; and I do not hesitate to give it as my opinion, that if it is properly applied in time, it will be found to be of more service than most of the external applications that are at

present used. You are well aware that in many cases, we have to lament the failure of every exertion.

It is with heartfelt pleasure I say, that I have lost very few in fevers, since I have been at Yarmouth, although we have received a great number in the low typhus fever into the hospital; nor is there one instance of the contagion being communicated to the surrounding patients, which I attribute to the nitrous gas, cleanliness and free ventilation.

When the wards were filled with the nitrous vapour, patients who had weak lungs, coughed violently at first, but they breathed more freely afterwards, especially if the atmosphere was thick and heavy, but I never observed any bad effects from it, even with patients in the last stage of consumption. The nitrous vapour has a most astonishing effect in correcting the fætor in the wards, arising from extensive bad ulcers: this alone is a great comfort both to the patients and attendants. I have so high an opinion of the nitrous vapour for destroying contagion, and as a corrector of foul air, that I have in the strongest manner recommended the use of it to several of my friends, in the different factories in the Mediterranean.

There are many navy surgeons prejudiced against the nitrous fumigation, besides it gives some trouble, which will at all times operate powerfully with the indolent.

Much praise is due to the ingenious author of the nitrous vapour. I have not the honour of his acquaintance, nor did I ever read a word he wrote (for which I blush) on the subject, but I should be wanting in candour if I did not faithfully relate facts as I found them; and in my opinion, the nitrous vapour tends greatly to destroy contagion, and is a most powerful corrector of foul air. Query, Whether or not does it give an additional quantity of oxygen (*pabulum vitæ*) to the surrounding atmosphere, where it is diffused?

I do not expect to have fewer patients in the hospital than we have at present: there are fifty-three ships of war employed in the North Sea, and they never go to Sheerness but when in want of repairs. When the fleet comes in, I expect to get fifty or sixty fresh patients, and they are weekly sending in sick by the frigates and cutters. There are only two men in the hospital that were wounded in Lord Duncan's action, and the bad ulcers that were received last winter are mostly gone, yet the number is still kept up. There are more cases of ulcer received into this hospital, in proportion, than into the two royal hospitals, ulcers as well as pectoral complaints being more frequent in the North Sea, than in the Channel. I have also remarked that those who had the most obstinate ulcers had been for some years during the war in the East or West Indies, or in the Mediterranean.

I have an ample field here for observation, but little time to put my observations on paper, as between the hospital, sick quarters, and prison, I am kept constantly employed.

(Signed)

JOHN SNIPE.

Dr. Johnson.

*Extract of a Letter from I. Blatherwick, Esq.
Surgeon. Dated Farham, June 17, 1798.*

SIR,

Not having taken minutes of any observations I may have forwarded to you on the subject of the nitrous vapour, I am not enabled to state with the precision I could wish, the particulars relating thereto.—At the time we began to use the nitrous vapour as a fumigation, our hospitals were free from any contagious disease, and on the whole, as healthy as I ever knew them. But we never had so long a continuance of that healthy state, as while this vapour was used in the hospital; and it deserves notice, that soon after it was discontinued, under

the French administration, the typhus fever again made its appearance with considerable severity. No instance, to the best of my recollection, has occurred of that disease being communicated either to nurse or patient, whilst the nitrous fumigation was employed; whereas many instances occurred from time to time, previous to its use. The difference on entering a surgery ward, after using the fumigation, is more remarkable than any other, as it deprives those wards of the smell peculiar to them. I have also remarked, that fewer patients, with extensive ulcers, whilst this was used, became hectic, than formerly. In regard to consumptive patients, I am not at present qualified to speak decidedly from any proofs I recollect of its effects, but judging from analogy, I am induced to believe that patients of this description are as likely to receive relief (in so far at least as the nature of the complaint admits) as patients in any other disease; for whatever dislodges from the air, or corrects the noxious particles accumulated from the effluvia of diseased bodies, must mitigate the symptoms of this disease. No arguments I am master of can induce the French surgeons to adopt it; they complain of its exciting cough, and injuring the catarrhal complaints. They content themselves with burning a few pounds of juniper berries, daily in each hospital, notwithstanding the effect of the discontinuance of the former practice, has been evident enough to convince any unprejudiced person which deserves the preference. On the whole, I infer, that the *nitrous vapour* is possessed of strong antiseptic qualities—is capable of being administered in every disease—can be procured with facility in all places—requires no extra information in the operator; and, in short, is the best fumigation I am acquainted with, to be employed where the patients remain in the wards.

(Signed)

I. BLATHERWICK,
Superintendent, &c.

James Johnston, Esq.

*Letter from Captain Lane, of the Navy. Dated
Plymouth, June 19, 1798.*

SIR,

Having been particularly engaged with the Admiral for some days past, I have not been able to answer your letter before, otherwise I should not have been so tardy in expressing the satisfaction I feel; in offering my testimony of the apparent advantages derived from fumigating with the nitrous acid, in checking at least, if not in stopping contagion. Had I supposed that the smallest doubt remained on the subject, I should have kept a very minute account of every experiment, but as I conceived the thing to have been uncontrovertibly proved before, I satisfied myself with having recourse to it, whenever there was any appearance of occasion for so doing, and I can with safety say, without ever having been disappointed. On receipt of your letter, I immediately sent it to Mr. Harris, who has returned it to me, and who I find is exactly in the same predicament as myself, having been prevented making any particular remarks, by entertaining the same opinion of its efficacy as I had, and having been equally satisfied with the result of his experiments.

With regard to the comparative degree of sickness between the prisons and ships, I must refer you to the weekly returns. I can however say, that when I first obtained Dr. Smyth's fumigating materials for the latter, a typhus fever was raging on board the *Prudent*, which in Mr. Harris's opinion, was so far alarming as to induce me to remove the people from her for a few days, during which time I had her twice fumigated and the decks white-washed, after which, the same prisoners were returned to her, and she has since been as healthy as the other ships. When it is considered how hot the weather has been, and that I have at times been obliged to put as many as 600 prisoners in the sixty-fours, I am induced to attribute the

preservation of their health; to the effect of the fumigation, which regularly takes place every Thursday morning in all the ships when the weather permits, having long since established a signal to ensure its never being neglected in any of them. With respect to the prison and hospital, I am informed by Mr. Harris, that, whilst he had the materials for the nitrous fumigation, it was made use of when wanted, and always with the desired effect; but on the French government taking charge of the sick, the fumigating materials were returned to the Royal hospitals along with the other stores.

Sorry I am indeed not to have it in my power to be more particular; for nothing can be more satisfactorily proved in my mind, than the efficacy of Dr. Smyth's means of checking, if not of destroying contagion; and I cannot but congratulate that gentleman on a discovery which I certainly consider as highly beneficial to mankind, as it must be grateful to his feelings.

(Signed)

CHA. HEN. LANE.

James Johnston, Esq.

*Extract of a Letter from Alexander Brown, Esq.
Surgeon of the Royal Sovereign. Dated Torbay,
May 27, 1798.*

As a fumigation for a sick room, I consider the *nitrous vapour* as an elegant, ingenious, and useful one. In the morning whilst dressing the sores, two pots are employed for fumigating them; the smoke or vapourous gas evidently sweetens the air; and I do not observe that any particular irritation of the lungs is excited. I have two patients labouring under phthisis pulmonalis; they are commonly placed near to the persons fumigating. I do not find that they cough more than usual, unless they hold their heads over the fumigating vessel. I commonly fumigate the sick birth every night, and the

people who sleep there, say the place feels wholesomer than it does when not fumigated. As for its producing contagion, I have no reason to believe it does; at least I have never yet found correctors or sweetners of foul air, have that effect.

Some of my brethren here declare that there never was such a heavenly discovery for the cure of ulcers of all kinds, as the fumigation with the nitrous gas; and that it possesses a singular healing power (in all habits) which never fails; if so, I am singularly unfortunate. I have heard of Paterson's pamphlet sent to the Captains and Admirals; I am promised a reading of it; I shall then be able to judge how far I have administered the vapour with propriety.

(Signed)

ALEX. BROWN.

Dr. James Johnston.

Extract of a Letter from John Drew, Esq. Surgeon, dated London, the 17th of June, 1798.

Allow me to lay before you the following observation on the salutary effects of the nitro-vitriolic fumes, of which I was an eye-witness, whilst Surgeon of his Majesty's ship l'Unité. The ship was in general unhealthy; but there were two men in particular ill of putrid fevers, who lay on the lower deck; by constantly fumigating under their hammocks, I found the disease so much checked in its progress as not to extend to any other part of the ship's company.

(Signed)

JOHN DREW.

Dr. Johnston.

*Extract of a Letter from Mr. Snipe, Surgeon to the
Hospital at Yarmouth, &c.*

March 8, 1799.

I am glad to find Dr. Smyth has published his book ; but I wish he had deferred it a few weeks longer, for I think it is in my power to make appear in the clearest light to the whole world, the powerful effects of the nitrous vapour in destroying contagion. Since the 2d of last August, I have received above 800 patients into this hospital, in a state of highly contagious fever ; and there is not an instance of its being communicated to an English patient in the same hospital. Some of the nurses in the Russian wards have had slight attacks ; but none of them have died. Under Heaven, the nitrous vapour has been our salvation here ; but the strictest attention has been paid to cleanliness and free ventilation. I have been under the necessity of being strict to a degree of severity, much against my own feelings ; but I plainly perceived on the first of the business, the smallest relaxation would have been attended with the most fatal consequences,

Ever since the arrival of the Russians, one labourer has been constantly employed in fumigating the wards ; and two or three times a day, red hot stones were immersed in buckets of vinegar, all on the same principle of Dr. Smyth, and they were not permitted to take a rag into the wards they brought from their ships.

Dr. Johnston.

EXTRACTS FROM THE LETTERS AND JOURNALS

OF

SURGEONS OF THE NAVY,

(ON THE SUBJECT OF THE NITROUS FUMIGATION);

Transmitted to Dr. CARMICHAEL SMITH, by Order of the
BOARD for SICK and WOUNDED SAILORS.

*Extract from the Weekly Return of Mr. George
M'Grath, Surgeon of his Majesty's Ship Russel,
dated Oct. 26, 1796.*

Since we have had the Dutch prisoners on board, I have found particular benefit from fumigating with the nitrous acid in purifying the foul air, and preventing contagious fevers, which otherwise would have originated from the uncleanness, and filthy, indolent disposition of those men.

*Extract from the Journal of Mr. John Drew, Surgeon
of his Majesty's Ship l'Unité, between the 22d of
November, 1796, and the 28th of June, 1797.*

All the ^{intermittent} fevers and aguish complaints mostly proceeded from the badness of the weather, and the lowness of the decks, and dampness of the Unité, as the breathing of the people, and the wetness of the ship produced an infectious kind of air, which never failed to cause numbers to be taken ill, notwithstanding the use of stoves, and constant fumigation composed of vitriolic acid and nitre, which I found to be very useful, particularly in two cases of putrid fevers, as by constantly fumigating the place where they lay, the infection did not attack any more of the ship's company; the

exhalations, I think, would answer better if the fumigating pots were of another construction, which I refer to your determination.

Extract from the Journal of Mr. James Runcie, Surgeon of his Majesty's Sloop, l'Espiegle, between the 19th of February, 1797, and the 10th of February, 1798.

We had a great many scorbutic cases; but they were so similar in symptoms and treatment, that I have not thought it worth while to mention them; there were also a variety of febrile and other complaints, of which the above are the most considerable: the fever introduced by the French prisoners we had a great deal of difficulty in subduing, as the infection spread very fast among the people, owing to our being so much crowded, and the sick lying among the ship's company, not having room in the brig for a sick berth; we, however, got at last clear of it, by persevering in smoking the vessel with sulphur and tobacco every time we went into port: we found the method of fumigating with nitrous acid peculiarly serviceable.

Extract from the Journal of Mr. Alexander Aberdour, Surgeon of his Majesty's Ship Alexander, between the 24th of July, 1797, and the 23d of February, 1798.

I would only here observe, that I have tried the fumigation with the nitrous acid upon coming from Gibraltar, when we had the fever, and apprehend that its progress was arrested by it.

Upon superintending the business, I was seized with a head-ache and slight degree of stupor; every one enveloped in the fumes was affected with coughing.

Extract from the Journal of James Farquhar, Surgeon of his Majesty's Ship Theseus, between the 25th of February and the 26th of May, 1797.

I ordered the sick birth to be regularly fumigated every morning and evening at the time we were dressing the ulcers, and found that the nitrous vapour not only purified the air, but in great measure destroyed the very foetid, and almost intolerable smell occasioned by the discharge from the ulcers; the patients themselves likewise found it very refreshing.

I found myself frequently at a loss for want of a proper vessel to heat the sand in; if one or two small iron pots were ordered to be sent on board with the fumigating materials, they would be found to be very useful.

Extract from the Weekly Return of Mr. Thomas Moffatt, Surgeon of his Majesty's Ship Triumph, June the 24th, 1798.

Since last return, the ulcers have been carefully fumigated morning and evening, and I am happy to add, with considerable success. They all look clean, and some have made a little progress in healing already; the fever, which attended several, in a very great degree subsided after three or four days application.

The improvement of the smell in the sick birth is sensibly perceived by all.

Extract from the Journal of Mr. Robert Cinnamond, Surgeon of his Majesty's Ship Assistance, between the 9th of November, 1797, and the 5th of June, 1798.

The only diseases from which infection was to be dreaded were the fluxes; but from a proper attention to cleanliness, and a constant use of the

fumigating medicines, I was happy to observe there was not one man during these last seven months who suffered from contagion, their complaints being evidently produced either from exposing themselves to wet and cold, or drunkenness. From the small experience I have had of the fumigating medicines, I consider them of extreme great service.

Extract from the Weekly Return of Mr. James Rolloff, Surgeon of his Majesty's Ship Galatea, dated the 5th of August, 1798.

I find the fumes of the * vitriolic acid of great service.

Extract from the Journal of Mr. Robert Sabine, Surgeon of his Majesty's Ship Melampus, between the 20th of August, 1797, and the 19th of August, 1798.

The ship in general has been very healthy, having had no bad fevers on board, which I attribute to fumigating with the vitriolic acid and nitre (when the weather was so bad as not to allow the beds to be got up) which always took away the disagreeable smell there was between her decks, and by airing between her decks with stoves when they were wet.

Extract of a Letter from Dr. Withering, of Birmingham, to Dr. Duncan, of Edinburgh, published in the third Volume of the Annals of Medicine.

It is but seldom we see much typhus at Birmingham. The use of the nitrous vapour, in every instance of its adoption, stopped the further pro-

* This gentleman meant the nitrous acid.

gress of infection, so that I am persuaded we are much obliged to Dr. C. Smyth on this occasion.

Two Letters, addressed to Dr. Percival, of Manchester, originally published (by Order of the BOARD OF HEALTH) in the Manchester Chronicle, and republished here, as containing a more full Explanation of the Author's Sentiments on the limited Sphere of Contagion, &c. than is to be met with any where else.*

London, July 7, 1796.

MY DEAR SIR,

I am now to acknowledge your obliging favour of the 17th of February last, to which I did not give an immediate answer, being engaged in the experiment on board the Union, which I undertook at the request of the Lords Commissioners of the Admiralty, and the result of which I was desirous to communicate to you, as the best and most satisfactory reply I could give to your letter. I desired Mr. Johnson to send you a copy of my pamphlet on that subject, as soon as it was printed. Although I have been prevented from writing to you till now, owing to a variety of engagements and business, which it is needless here to explain, I can assure you I have not been forgetful of the benevolent undertaking of your Board of Health, which reflects so much honour on the gentlemen engaged in it, and to which I shall be at all times happy to contribute any assistance in my power to give. The very limited sphere of contagion is so

* Manchester, August 3, 1796.

"That the Thanks of this Board be given to Dr. J. Carmichael Smyth, for his letters, communicated by Dr. Percival, and that they be made public."

Signed by Order of the BOARD,

THOS. BELLOTT, Secretary.

well ascertained, that I have occasion to say little on the subject. In my book on the jail-fever, I have mentioned, after many years experience as physician to an Hospital, into which more typhus fevers were admitted in proportion than into any other, that the most highly contagious fevers, that occur in our hospitals, do not affect the patients in general, lodged in the same ward; for we had no appropriate fever wards; nor did I ever see the necessity for such, as the communication of infection was in general easily prevented by the means I employed. I have also mentioned, that there is no, or very trifling risk of contagious fevers being propagated in the open air, still less from one room or ward to another; and that I never knew contagion propagated by a dead body, even from the dissection of it, unless by inoculation. But, independently of all these observations, the fumigation with the nitrous acid, if properly employed, not only certainly destroys contagion, but improves greatly the atmospheric air, by supplying a quantity of dephlogisticated air, or oxygen gas; and it effectually destroys all offensive smell. I also, as you must have observed, use the diluted marine acid for washing the floors, bedsteads, &c. and put marine acid in the pails of water used for immersing the foul linen, &c. In bedchambers and private apartments I generally keep up, where there is a contagious disease, a constant fumigation; which can easily be done by means of a lamp over which is placed a china cup or saucer, with oil of vitriol and nitre, an ounce and a half or two ounces of each being sufficient for twenty-four hours. If you have any queries to put to me, I need hardly assure you, that I shall take a pleasure in answering them, and at all times of convincing you of the regard and esteem of, my dear Sir,

Your sincere friend,

J. CARMICHAEL SMYTH.

Dr. Percival.

London, August 1, 1796.

MY DEAR SIR,

I am this moment favoured with your letter of the 30th of July. I can have no objection to your making any use, public or private, of my letter to you. The accuracy of the facts I will be answerable for; but as it was a private communication to a particular friend, I was little attentive to the style or manner. Respecting the limited sphere of contagion I said the less, as I considered it a matter so well ascertained, and by such a body of evidence as required no additional proof. Mankind have been led into error, on this subject, by confounding under the general name of contagious or epidemic, diseases of very different natures and origin. But of all those contagions, that are propagated from one diseased person, or his clothes, to another person, the sphere of the deleterious power is in general so extremely limited, that there have been, and still are, some physicians, who believe they are only propagated by contact. At Winchester, during my stay there, one soldier only, whilst doing duty on the prisoners in the airing-ground, was seized with the distemper; and very few of the military suffered, although the guard-room was immediately under one of the prison-wards, and the sentinels mixed with the prisoners even in the courts and passages of the king's house or prison. And lately, on board the *Union*, none of the officers suffered, and few of the petty officers: nor would the ship's company have suffered so severely as they did, could their intercourse with the nurses and assistants in the hospital have been prevented. But independently of the limited sphere of contagion, I will venture to ensure even the nurses and hospital assistants, in any situation, if they will be induced to use the proper precautions, and if the hospital is properly fumigated; the wards sprinkled with diluted marine acid;

the dirty linen, &c. immediately immersed in pails, filled with cold water impregnated with marine acid; the chamber-pots, soil-tubs, &c. quickly removed and washed with the same; the bedsteads washed every time they are empty with the diluted marine acid; and the bed clothes fumigated with the nitrous vapour. In hospitals crowded with sick, in ships, prisons, &c. it is necessary to fumigate completely every part of the ship, prison, &c. twice a day. But in common cases, and in private practice, such means are not necessary; and one, two or three fumigating lamps, in which a constant fumigation is kept up, night and day, so as to pass over the beds of the sick, are perfectly sufficient. In this manner I have not only stopped the common contagion in the hospital and in private, but I have equally succeeded, which is of great consequence to be known, in preventing the scarlatina anginosa, or putrid sore throat, from being communicated to the rest of the family living under the same roof. Whether this will apply to the small-pox, I cannot say from my own experience; but I have been told by Dr. Rollo, Surgeon to the Artillery, and Mr. Cruickshank, Professor Royal of Chemistry to the Academy, that it destroys the *miasma* of the small-pox; and that of two quantities of matter, taken for the purpose of inoculation, one was exposed to the nitrous vapour, the other not; the persons inoculated with the first were not seized with the disease, whilst the inoculation took the usual effect, when performed with the second.

I ever remain, with sincere regard,

Yours truly,

J. CARMICHAEL SMYTH.

Dr. Percival,

CONCLUSION.

WHOEVER reads the preceding pages with attention, must be struck with the great conformity of opinion, observable amongst the different individuals, in regard to the principal object of our inquiry, viz. the power of the nitrous vapour to destroy contagion.

But although the same sentiment universally prevails, I cannot help remarking, that whilst the opinion of some gentlemen is founded on general observation alone, the opinion of others is supported by such an accurate detail of facts reduced to the certainty of arithmetical calculation, as carry with them a conviction, little short of demonstration itself.

The power of the nitrous vapour on contagion once established, all its other effects can easily be understood and explained; one of the most obvious of these is its destroying putrid smell. Although I am far from imagining that putrid smell and contagion are one and the same, on the contrary, am convinced that they often exist independent of each other, yet as they are of the same family, and arise from a common cause, we may fairly suppose from analogy, that what destroys the one, will prove effectual in destroying the other. I confess, that where there is a direct and positive proof, as in the present instance, reasoning from analogy is of little consequence. The observation, however, is in itself important, particularly for those whose duty leads them to an attendance on the sick, as the offensive smell to which they are exposed, constitutes not the least disagreeable part of such an office.

But besides removing the offensive smell of hospitals and prisons, another advantage of the nitrous

fumigation is that of rendering the air purer and fitter for the purposes of animal life; a fact which chemistry readily explains. From it we learn, that in the decomposition of nitre by the vitrolic acid, a certain proportion of vital air*, or oxygen gas, is let loose; and physiology informs us, that this air, which constitutes a very interesting part of our atmosphere, is necessary for the respiration of animals, at the same time that it is constantly consumed by it.

In a former publication I did not hesitate to give a decided opinion, (judging partly from experience, and partly from the similarity of putrid contagions) that the nitrous vapour would be found equally an antidote to all†, even to the plague itself. I have now the satisfaction to see this opinion confirmed, in so far at least as relates to the dysentery, a putrid disease equally contagious with the jail fever, and in military hospitals, at least, still more fatal.

The efficacy, however, of the nitrous vapour, as appears from almost the whole of the reports, is not confined to the destroying or preventing the communication of contagion; its salutary influence is no less remarkable on the sick and on those recovering from sickness; but on this very important subject, I could wish the reader to consult Mr.

* "In answer to Dr. Smyth's question, 'What is the proportion of oxygen and nitric acid, disengaged by adding half an ounce of oil of vitriol to half an ounce of nitre?' I reply that I do not recollect any experiment which has been published to ascertain the proportion of oxygenous air thus extricated, though the fact of its extrication is well known, &c.—*Extract of a Letter from Mr. Keir of Birmingham.*

† This fact becomes the more important, it being now clearly ascertained, that the yellow fever in America at least, is produced by imported contagion. The advantage to a commercial country of being able to counteract all communications of this kind, without subjecting the merchant to the expense and delay of quarantines, is hardly to be calculated.

Paterson's Table of the Weekly Returns at Forton Hospital, from which it appears, that during the short space of six weeks, in an hospital containing from 300 to 400 men, there was a difference, from employing the nitrous fumigation, of about 50 lives saved, and about 110 men restored to a state of health fit for active duty: but if the reader is desirous of forming an accurate judgment of the immediate effect of the nitrous vapour on those ill of typhus fever, I would advise him to read with attention, what Mr. M'Grigor and Mr. Hill have written on the subject. By Mr. M'Grigor we are told that, some years back, during the prevalence of a fever similar to the one he describes, in the same place, the island of Jersey, the 88th regiment, to which he belongs, in the space of ten weeks, suffered a loss of 40 or 50 men; whereas during the present illness, when he employed the nitrous fumigation, of 64 men seized with the fever, he did not lose a single patient. He further remarks, that by using constantly the nitrous vapour, the malignant symptoms of the disease disappeared, and that from a typhus it became a simple fever.

But of all the advantages to be derived from the use of the nitrous vapour, none is more remarkable or likely to be of such extensive application as its effect on ulcers, an effect first taken notice of by Mr. Paterson, and which has been confirmed, upon every subsequent trial.

That the nitrous vapour, by correcting the malignant and contagious air of hospitals, which is known to affect*, more or less, all persons confined

* " Having related the most distinguished marks of this fever, I shall only add, that there are sometimes slight degrees of it hardly to be characterised: and which can only be discovered in full hospitals, by observing the men to languish, though the nature of the illness for which they came in should seem to admit of a speedier cure. In such cases the only symptoms are slight head-achs, a whitish tongue, want of appetite, and other inconsiderable feverish symptoms." Vid. Pringle on the *Jail or Hospital Fever*.

in them, should so far at least prove serviceable to those affected with ulcers, and in general to surgical patients; we can readily believe, and indeed it is an induction to which we should have been led, reasoning as it is called *a priori*. But the nitrous vapour seems to be not only useful in this way, it is found of efficacy also as a topic or local application; its operation, however, as such, must have its limits; to suppose that it will prove a universal remedy for all ulcers, is an idea that cannot be entertained for a moment, by any one in the least conversant with the animal œconomy, or with the history of diseases. Those persons who are too precipitate in general conclusions, have commonly some ground to go back again.

Were I to form a conjecture respecting the kind of ulcers in which the nitric acid, either in a gaseous or liquid state, is likely to be found most serviceable; I should say, the sloughy or sphacelous, the scrofulous, and the scorbutic: but those gentlemen, who are professionally engaged in the treatment of such complaints, will look upon this observation more as a hint than an opinion.

The preceding effects of the nitrous vapour are what have been observed by all or by many; but there is one which rests as yet on the authority of Mr. Paterson alone. He only has made trial of it, and with success, in the whooping cough. His remarks on this subject, I must say, are extremely interesting, and open a wide field for the reflexion and experience of the practical physician.

Having finished the few observations I had to offer, on the letters and reports which I have now the honour to lay before the public; the reader I hope will pardon me if I detain him a few minutes longer, to make one remark which relates principally to myself. It cannot have escaped his notice any more than it has done mine, that, as appears by several of the letters, there are prejudices entertained against the nitrous fumigation by many

surgeons of the navy. At this I am by no means surprised; we are all children of habit, and unwilling to relinquish opinions which we entertained in early life: the introduction, however, of the nitrous fumigation into the navy, has been opposed not by prejudice only, but by arguments drawn from chemistry. It would be no very difficult task for me to point out the fallacy of such chemical reasoning; but to endeavour to refute by argument what is directly contrary to experience and observation, would be an abuse of time, and an insult to the public judgment. The only answer then that I shall give to such philosophers, is to address them in the words of an author, whose opinion must be considered of high authority on such a subject, as he was not only a physician of character, but certainly one of the first chemists in Europe; the circumstances and occasions were perfectly similar. “ Comme il* n’a certainement
 “ eu en vue que le bien de l’humanité, il me per-
 “ mettra quelques reflexions qui ont bien pu
 “ échapper au savant chimiste, mais qui ne pou-
 “ voient manquer de frapper un médecin, qui
 “ quoique amateur zélé de la chimie & convaincu
 “ des avantages qu’elle peut procurer à l’art de
 “ guérir, a été trop souvent témoin des erreurs que
 “ cette science a portées dans la médecine, pour
 “ n’être pas toujours en garde contre elle; d’autant
 “ plus même, que ses raisonnemens sont plus
 “ séduisans, & ses expériences en apparence plus
 “ concluantes.”

*Mémoire par Monsieur Bucquet,
 Professeur de Chimie, Censeur Royal
 De l’Académie Royal des Sciences, &c.*

* The person alluded to was le Sage, who opposed chemical reasoning to experience and observation.

READER is requested to see complete Evidence of a Medical Fact, that ever

Monthly and daily RETURN of the CONVICTS attacked with the febrile progressive St-Fever on board the Hulks, and received into the Sincerity, from the Spanish Prisoner Ship, in Langstone Harbour, from the 6th of July to the Winchester, from the 1st of December, 1798. By S. HILL, Surgeon to the Hospital. until the 8th of J

Date of Weekly Accounts.	Days	Number	Month	Days	Number	Month	Days	Number	Month	Days	Number
ch 26, 1780	—	16	Oct.	16	3	Nov.	1	1	Dec.	1	3
il 2, —	—	66		17	2		2	1		2	2
- 9, —	—	120		18	1		3	—		3	3
- 16, —	1	5		19	2		4	1		4	5
- 23, —	2	3		20	3		5	—		5	—
- 30, —	3	7		21	4		6	3		6	5
- 7, —	4	11		22	3		7	1		7	4
- 14, —	5	3		23	1		8	1		8	3
- 21, —	6	7		24	3		9	—		9	2
- 28, —	7	3		25	2		10	7		10	2
e 3, —	8	4		26	1		11	7		11	3
- 10, —	9	2		27	2		12	3		12	2
- 17, —	10	2		28	1		13	1		13	1
- 24, —	11	6		29	1		14	—		14	2
- 1, —	12	8		30	0		15	—		15	1
- 8, —	13	3		31	1		16	—		16	3
The time of Dr. Carn	*14	5					17	—		17	2
	*15	9					18	—		18	2
							19	—		19	H 6
							*20	—		20	2
							21	H		21	2
							22	1		22	3
							23	7		23	2
							24	4		24	1
							25	—		25	1
							*26	2		26	2
							27	3			
							28	2			
							29	2			
							30	H 3			

Weekly Return of the
16th of October to
PATERSON, Esq.

The Nitrous Vapour was

Highest Number in the Hospital.	Number discharged.
223	2
372	4
371	0
369	1

In the evening of the 15th of October, we began to fumigate the hulks, continued to do so every day to the 20th of November, (the 9th and 10th month excepted;) on the 20th, the fumigation was discontinued, but on the 26th, and continued without interruption to the 13th of January 1799, though on the 26th of December the sickness had entirely

On the 21st of November, eight persons ill with the jail-fever, or by ship, outward bound; eleven more were received on the 1st of December, and five on the 19th of December: in all twenty-six

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for transparency and accountability, particularly in financial matters. The text notes that without reliable records, it is difficult to track progress, identify trends, and make informed decisions.

2. The second part of the document outlines the various methods and tools used to collect and analyze data. It mentions the use of surveys, interviews, and focus groups to gather qualitative information, as well as the application of statistical software for quantitative analysis. The importance of ensuring the reliability and validity of the data is stressed throughout this section.

3. The third part of the document describes the process of interpreting the collected data and drawing meaningful conclusions. It highlights the need for a systematic approach to data interpretation, involving the identification of key findings, the comparison of results with existing literature, and the consideration of potential limitations. The text also discusses the importance of communicating the findings clearly and effectively to the relevant stakeholders.

4. The fourth part of the document provides a summary of the overall findings and conclusions of the study. It reiterates the key points made throughout the report, emphasizing the significance of the results and the implications for future research and practice. The text concludes by expressing the hope that the findings will contribute to a better understanding of the topic and inform decision-making.



